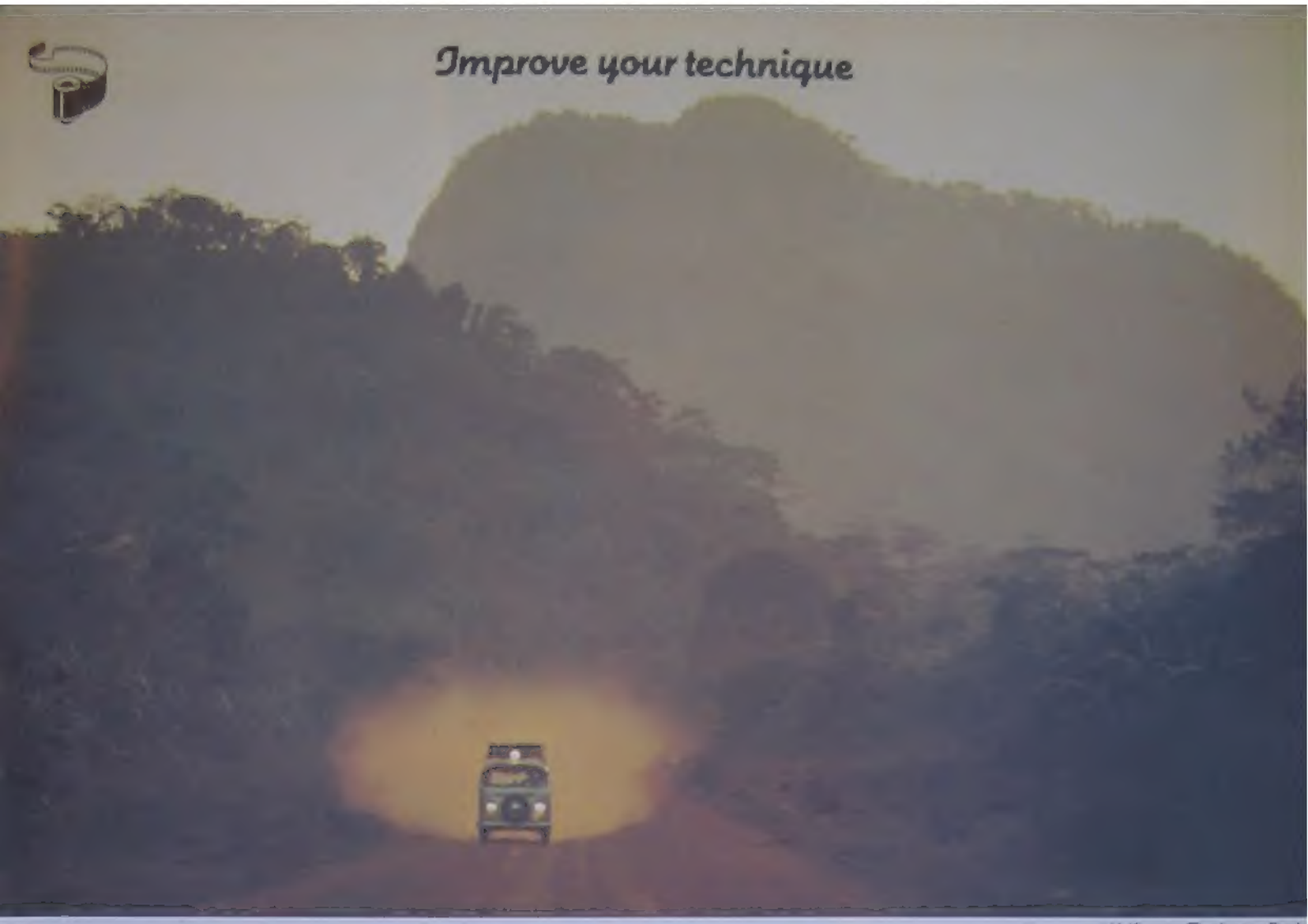


V. Kramer/The Image Bank

Going on safari

An African safari offers a wealth of opportunities for photographers. But to make the most of such a trip it is important to know what problems you are likely to face

Announce that you plan to go on a photographic African safari and you will get plenty of advice—but little of it based on actual experience, and much of it probably conflicting. Not knowing what to expect, you may end up by taking totally unsuitable gear, and possibly wasting a rare opportunity.

An increasing number of people are now able to travel to the famous game parks of East Africa, however, and there is no need to be unprepared. The game parks offer marvellous opportunities for photography, but the approach and equipment you will need may be quite different from what you are used to, even if you are fairly experienced in wildlife photography.

Before you leave home you will probably have a preconceived idea of what conditions will be like. In fact, the equipment and materials you will need depend more than usual on the kind of vehicle you will be travelling in, and even on the driver and the other people you are with.

It is possible to book two- or three-week photographic safaris, where you will be in the company of other photographers and where you should have ample time to take the shots you want. But many people travel on a package tour to a tourist resort, with the safari as an extra.

If you are travelling on a package holiday, you will probably be offered a standard three-day safari when you book. The price may well be lower than what you would pay if you were actually in Africa, as the operators like to receive foreign currency. The only disadvantage —and it could be significant—is that you will probably not be able to see what kind of vehicle you will be travelling in beforehand. If you book when you are actually on the spot, you can see what sort of facilities each firm offers, and assess the condition of their vehicles.

Driving dust *A constant problem when driving is dust which gets into the vehicle and on to your camera gear*

The type of vehicle you travel in is very important to the success of your photography. Most unsuitable of all is an ordinary coach or bus. Though the windows will probably slide fully open, you are very restricted in the view you get and it can be very difficult to steady the camera. There are so many other people on the bus that you will have little say in how long you stop at any particular location, and will probably not be able to leave the vehicle except when everyone else does. Coaches are unsuitable for game drives, but even if you transfer to smaller vehicles once in the game park, you may miss many good shots on the way there.

The most common vehicles for safaris are of the Volkswagen Kombi variety. These have seats for seven people plus

Michael Freeman

driver, and have a roof which lifts up sufficiently to allow those in the back to stand up. There is enough room to rest a camera or mini tripod on the non-lifting part of the roof, and there is reasonable all-round visibility even when others are standing up.

These vehicles are not particularly suited to the rough terrain, though they stand up to it remarkably well. Better designed for the high temperatures, dust and poor road surfaces are vehicles such as Range Rovers or Land Rovers. Some have lifting roofs, and are particularly suitable for safaris. Even in the dry season muddy patches may be encountered, and four wheel drive could be invaluable.

It is also possible to travel on safari in an ordinary saloon car. These can be hired, and are likely to be more comfortable than one of the tour operators' vehicles. A sunroof would be very useful, although you cannot gain as much height as in a Land Rover or Kombi.

Some vehicles are equipped with attachments that allow a camera to be mounted directly on the vehicle. This can be an advantage if there are not many other people in the vehicle, but may be rather restrictive if things happen quickly and you are limited to views on one side of the vehicle only.

It may be tempting to hire your own vehicle and choose your own itinerary. This is not particularly dangerous, but there are advantages in having the expertise of a local driver. He will know the best places to find particular animals, and may well be able to spot animals merging in with the bush, which you would otherwise miss. He will also get information from other drivers, or from local people who speak little English.

What to expect

A three-day safari usually consists of a long drive to one national park, followed by long drives through the various parks along unmade roads. Much of the time is taken up by travelling, with occasional halts for picturesque views or small groups of animals. There is no reason why you should not see game on the way to the parks, since the animals are not restricted in any way, other than those which are in the wildlife parks near cities, for example, which are similar to safari parks elsewhere but on a larger scale. There is a tendency to photograph every antelope that appears at this stage, but you will almost certainly see more animals when you get to the park itself. Even so, events are unpredictable and it is worth taking a few 'contingency shots' at this stage. Although most people do see a good range of animals, it is possible that even an area you have heard good reports of may suddenly be deserted. This applies particularly to the huge Kenyan parks, Tsavo East and West. You can drive long

Support variations *There are many ways you can support your camera. Probably the simplest is to use a towel (above) on the roof of the vehicle. A securely mounted tripod head (below) gives maximum steadiness but restricts your shooting position. A bean bag (bottom) is most useful but can be very bulky to carry around*

Michael Freeman

distances through either of these and catch no more than a fleeting glimpse of some animals, while other people a few days earlier or later, or in another season, may see multitudes of animals. Other areas, such as Kenya's Masai Mara or Tanzania's Ngorongoro Crater, are usually more reliable. So while it is worth taking some pictures of the first animals you see, do not use up too much film on them. You will at least gain some experience of photographing from the vehicle you are in.

A typical encounter with an animal occurs while bouncing along the road at speed. The driver spots something and comes to a halt. The animal pricks up its ears as he does so, and the occupants of the vehicle all crowd over to one side to try to catch a glimpse of the animal, which by this time has either run off or is thinking about it. There is no time for anything except a 'grab shot'—a straightforward spur-of-the-moment snap, with little time for composition or exposure control. If the animal does hang around for a longer time, it is unlikely that the others with you will want to continue looking at it for a long time while you fiddle with lenses, particularly if you are on the way somewhere. Quite often the driver will not even switch off the engine, which means that you have the vehicle vibration to contend with. If this happens, it is always worth asking him to do so, but he may be unwilling to in case the engine does not start again.

The journeys to the game parks can be quite arduous, both for you and for your equipment. The roads are rough and the distance to be covered is great, so drivers often travel at quite high speeds. You have the choice of becoming very hot with the windows closed or getting covered with dust with the windows open, particularly if your vehicle is following another. Any uncapped lens will rapidly become coated with red dust, and changing a lens offers the chance for dust to get into the camera. While travelling, it is a good idea to keep all the lenses you are not using wrapped in plastic bags.

The jolting of the vehicle is guaranteed to undo any loose knobs or screws on your equipment. Your tripod in particular will suffer from this—the knobs on the pan-and-tilt head will almost certainly undo themselves and get lost on the floor. You may not notice this loss until you have left the vehicle. Keep checking that every knob, screw and bolt is tight. As for personal comfort, a Thermos of any cold drink is welcome. It is not common for vehicles to carry any supplies of water.

When you reach the park, you will probably find that the safari lodges are well appointed and comfortable. There is often a fair amount of wildlife to photograph even there—birds, monkeys baboons and antelopes. This may actually be your only chance of taking pictures at your own rate, with time to compose each shot. Make the most of it—even the smaller animals may be unusual and worth a picture. Some lodges are built near waterholes and in the evening and early morning you can photograph the animals coming to drink.

Many safaris include an early morning game drive before breakfast which is worth getting up for. The animals are often at their most active at this time.

Chris Harvey

Distant dinner *A mirror lens, like the one used for the above shot, allows you to shoot without disturbing the scene, yet is very light and compact*

Chris Harvey

Cheetah *A medium telephoto may be quite adequate since you can often drive in very close to the animals*

The animals

Finding particular animals is best left to your driver. If there is a particular animal you want to see, mention it and he may be able to ask around. He may

ignore such unglamorous but amusing animals as warthogs, or birds, in favour of the classic big game such as lions, rhinos and cheetahs. Such creatures as giraffes, zebras, antelopes, elephants, buffalos and waterbuck are usually plentiful, while you will be very unlucky if you do not see any lions. It is worth finding out something about the animals of the area beforehand so that you can tell the difference between, say, an impala and a Thomson's gazelle when you see one.

Shy impala *Even timid animals can be photographed using only moderate telephoto lenses, with patience*

Hugo van Lawick/Nature Photographers Ltd.

Among the easiest animals to photograph, surprisingly enough, are lions. They spend most of their time lazing around, and simply watch impassively as vehicles draw up around them. It is possible to get pictures of lions under these circumstances with the simplest of cameras, with no special lenses. Large animals such as elephants and buffalos may also be approached by an experienced driver, but anyone unfamiliar with the habits of the wildlife should keep a respectful distance. Any animal with young, in particular, is likely to feel threatened if you get too close.

It is far more difficult to approach animals which are preyed on, such as antelopes, zebras, giraffes and ostriches. In some places these may have become used to the presence of vehicles, but in others they will run away as soon as your vehicle approaches within a certain distance—usually just a little too far for good photography. Sometimes they will wait for a while, then become disturbed by the strange object with heads bobbing about inside, and will run away just as you have decided that you can afford to change to a longer focus lens.

If you are driving yourself, rather than using a local driver, you may be able to wait long enough for the animals to settle down. Self-driving gives you this flexibility but you miss out on the local knowledge. In this case, the best policy is to assume that the locals know where they are going and follow them. Alternatively, keep an eye open for a small knot of other vehicles—you can be fairly sure that there will be lions or other interesting animals at the heart of it. You can also ask one of the park wardens for advice: he may even be willing to accompany you.

Sleepy cat *You should be constantly on the lookout for animals in unusual or unexpected places*

Taking the pictures

Ideally, on a photographic safari you should take as wide a range of photographic equipment as possible—the heaviest tripod, the longest focal length of lens you can afford, and everything in between. In practice, you will have to select carefully. The more equipment you have, the harder it is to move around.

A good deal of your photography will be grab shots. The ideal equipment for these is a focal length of around 200 mm and an auto-exposure camera. An 80–200 or similar zoom lens is adequate, but its maximum aperture of, say, *f*/4 is reduced by up to half a stop by internal absorption, so a fixed focal lens will give superior results and allow you to choose a faster shutter speed. But the zoom does have the advantage of also allowing you to take pictures of the larger animals which you can approach more closely, so it is probably the most useful all-round lens.

Keep the camera on as fast a shutter

speed as you dare: the depth of field is not too shallow at the distances you are likely to be focusing on, so it is probably better to make sure that the shot is not spoiled by movement—either your own camera shake, movement or vibration of the vehicle, or someone else's nudging in the melee to get a view.

A longer focal length is also worth having, where you have the opportunity to take more care over your photography. A lens of, say, 300 mm or longer is somewhat unwieldy for grab shots, however, as it must be used with some support. Many people imagine that a very long focal length is essential on safari: this is not so, but it is certainly a valuable part of your equipment. There will almost certainly be occasions where you can put one to good use. Rather than buy a lens for the occasion, you might find that a good quality ×2 converter for your 200 mm lens or zoom will give you all the magnification you need. Some of the best wildlife shots by experts such as Hugo van Lawick are taken with quite modest focal lengths—but he is able to spend time getting close to the animals and waiting for the action. Very long focal lengths also emphasize the effects of heat haze.

Wide angle lenses are useful for scene setting: you can take pictures of your companions actually watching a pride of lions from inside your vehicle.

Supporting the camera can be difficult. One of the simplest methods is also the most flexible—use a towel to rest your camera on the roof of your vehicle, assuming it has a lifting roof. A towel can also be useful if you have to photograph from a bus. A bean bag is more versatile than a towel, though not as easy to obtain. Both a towel and a bean bag allow you to rest a camera against an awkwardly shaped surface while pointing it in the direction you want. Another portable item, particularly valuable in a bus, is a monopod. With this supporting the camera and the lens resting on the window or roof of the vehicle, with a towel or bean bag in between, you have a steady support.

The lighting in Africa is not always brilliant. In summer it can be noticeably stronger than in temperate latitudes, but for much of the time there is no more light than you are used to. It can be cloudy or dull, so you should not assume that light will be no problem when choosing what film to take.

Your choice of film is quite critical. You can make use of the entire range of film speeds, from 25 to 400 ASA (ISO), on a safari, but all at different times. If you have a reasonably fast lens, of *f*/4 or wider, you can make use of fairly slow, fine grain film for your grab shots as well as for general work. A film of 64 to 100 ASA is adequate in sunny conditions, and will allow greater enlargement. If the light is not very good, as on cloudy-bright days or on early morning game drives, then faster film is needed—up to 400 ASA. Fast film is also necessary if you want to use a long focal length, slow lens from a vehicle. At the other end of the scale, you can use 25 ASA Kodachrome in circumstances where you have time to secure high quality shots. As you are likely to be using more film than usual, it is quite feasible to choose a particular film for just a fairly short session—it will soon be used up. Even so, two camera bodies, loaded with different speeds of film, can be very useful.

Typical Exposures

A typical maximum setting for bright sunlight using 64 ASA film is 1/125 at *f*/11, or 1/250 at *f*/8. This means that if you have a 500 mm mirror lens, whose f-number is 8, but which loses a stop or light as a result of the central obstruction, you can only take pictures at 1/125 second and will need some support even in bright conditions.

A 300 mm f/4 zoom lens may lose half a stop of light to internal absorption, while a ×2 converter has a further loss of two stops. This means you are working at *f*/16, and can use a shutter speed of about 1/175, not enough for you to hand-hold the lens.

These are settings for the brightest lighting conditions, between 9 am and 3 pm. At other times, you must either use good camera supports or shoot on faster film. 400 ASA film will allow you an extra 2½ stops, allowing you to hand-hold the camera in duller conditions.

Chris Mercury

Sunset hues *The best times of day for photography are often at dawn or dusk when a faster film may be useful*

Special b & w films

There are many subjects for which ordinary black and white film is unsuitable. To photograph them satisfactorily, you must choose the most appropriate from a wide range of special purpose films

In addition to the familiar range of black and white films used for everyday photography, there are many others designed for specialised purposes. A special b & w film might be suited to a particular job that you have in mind, so it is worth knowing what is available.

Even if you consider only those films with 35 mm sprocket holes, which can be used in an SLR, there is still a bewildering range. Each has a specific role, but there is no reason why you should not use them for different purposes. For example, microfilm is ideally suited to copying documents, but it can also be used for photographing the sun, with suitable equipment. Alternatively, high speed film designed for surveillance purposes in low light can be used for moody shots in night clubs and so on, or for exaggerated grain effects on landscapes. But a word of warning—it is only worth considering specialist films if you have tried the appropriate conventional film and found it unsuitable. There is no magic ingredient that will instantly transform your general photography.

Few special purpose films can be bought over the counter from a dealer in the usual way, because there is so little demand for them that they would become outdated before they were sold. They must be ordered but in many instances, dealers will not supply less than a certain minimum quantity. And the fear of being left with outdated stocks of films that are little in demand is so great that most dealers ask for payment at the time of ordering, because some customers do not return for goods ordered.

Conventional films already cover a wide range of performance. They are all *panchromatic*—that is, they are sensitive to the visible range of colours—and they have roughly the same relationship between speed, sharpness and grain so that an increase in speed gives coarser grain with some loss of sharpness. This relationship is inherent in the nature of film, so with the exception of the chromogenic films Ilford XP1 and Agfa Vario XL (see page 394), there is no advantage in providing a specialist film that has similar characteristics to conventional films. This means that specialist films generally extend the range of properties of conventional films, for example in terms of speed, or in colour sensitivity, or in the exposure time for which they are designed. Generally speaking, special purpose films fall into one of three broad categories—high contrast; special colour sensitivity; and technical and recording films.

Robinson/Brown

Minimum order *Specialist black and white films are packaged as single cassettes or rolls of 30 m or more*

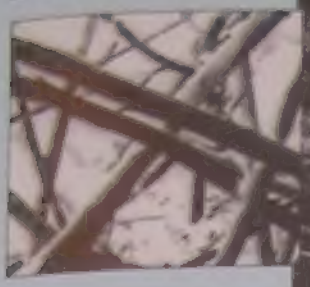
High contrast films

Ordinary camera films cannot give sufficiently high contrast for copying line diagrams or documents. One popular film for this purpose is Agfaortho 25. This has a speed of about 25 ASA (ISO) and, being insensitive to red, it can be developed by inspection in the light from a red safelight. An ordinary print developer can be used for 2 to 4 minutes, if this is convenient.

Many firms make slow, high contrast films, typical names are Microfile and Microneg, but there are many others in this group. A few are blue-sensitive only but most are panchromatic with a film speed of about 25 ASA. When slow, contrasty films are used for copying, they will have a different response from the quoted speed. For example, Recordak AHU Microfilm 5460 is rated at 64 ASA for copying and 2 ASA for general purpose photography. A few experiments are always advisable to find the optimum setting under individual circumstances. ('Recordak' is a Kodak trade name and is pronounced with the accent on the first syllable.)

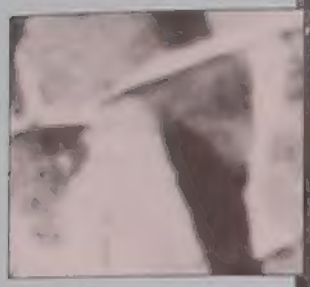
Where the background of a diagram or document is faded or has a yellowish

LPD 4



Very high contrast *positive ortho film, rated at 2 ASA and developed in a paper developer*

5302



Fine grain *and very high contrast, rated at 2 ASA and developed in a paper developer*

LITH FILM

Suitable for slides, *rated at 20 ASA and developed in a paper developer*

RPC

Direct reversal *rapid process copy film, rated at 5 ASA and developed in a paper developer*

Bob Cross

tint, a fine grain release positive film is used. More usually, this is called Fine Grain Positive or just Positive film. Kodak manufactures this as Type 5302. Fine Grain Positive resembles a paper emulsion on a transparent base. The name comes from its use in producing positive transparencies from prepared negatives but this is best done outside the camera. The film's very fine grain makes it suitable for high quality recording of continuous tone subjects.

The various high contrast films are particularly suitable for direct reversal processing—the making of black and white transparencies. This method is an alternative to the more usual one by which negatives are printed on to film in the darkroom.

Essentially, the direct reversal process consists of development, bleaching and redevelopment. Although effective, this method gives little range in either exposure or processing. Agfa-Gevaert Dia-Direct is a panchromatic monochrome slide film. It is rated at 32 ASA, with a high resolution and fine grain. Films intended for reversal processing should not be developed as negatives (see page 978), because the dichroic silver used against halation must be dissolved in the reversal bleach bath. There is, however, a 35 mm film—LPD-4—that gives a positive image without reversal printing. This film is slow, blue-sensitive and of high contrast. The reversal stage is omitted simply by processing in ordinary paper developer.

Kodalith film is available in 35 mm format, and is known as Kodalith Ortho Film 2556, Type 3. Though the unique effects available using lith film in lith developer are best suited to darkroom work (see page 914), you may find that it is suitable for some forms of copying or slide making. This film has a thin emulsion which is easily scratched, but its speed rating of between 10 and 20 ASA makes it suitable for use as an ordinary camera film.

Special colour sensitivity films

All films are sensitive to blue light and, to a lesser extent, to ultraviolet radiation. Others can be sensitized, by the addition of various dyes, to green. These films—called *orthochromatic*—were very common at one time but now they are scarce. The lack of red sensitivity can be used to give unusual effects, such as a dark red rose against a plain, white sky. Usually, however, the main advantage of blue sensitive and orthochromatic films is easy manipulation in the darkroom.

Normal black and white films are panchromatic—they are sensitive to the entire visible spectrum. For technical work, there are panchromatic films with extended red sensitivity—their spectral response is boosted at the red end. These are useful for shooting in low light levels, particularly indoors in tungsten light. The red sensitivity makes more use of the light available, particularly in

2476

Grainy *film with extended red sensitivity. It is rated at 500 ASA and developed in HC-110*

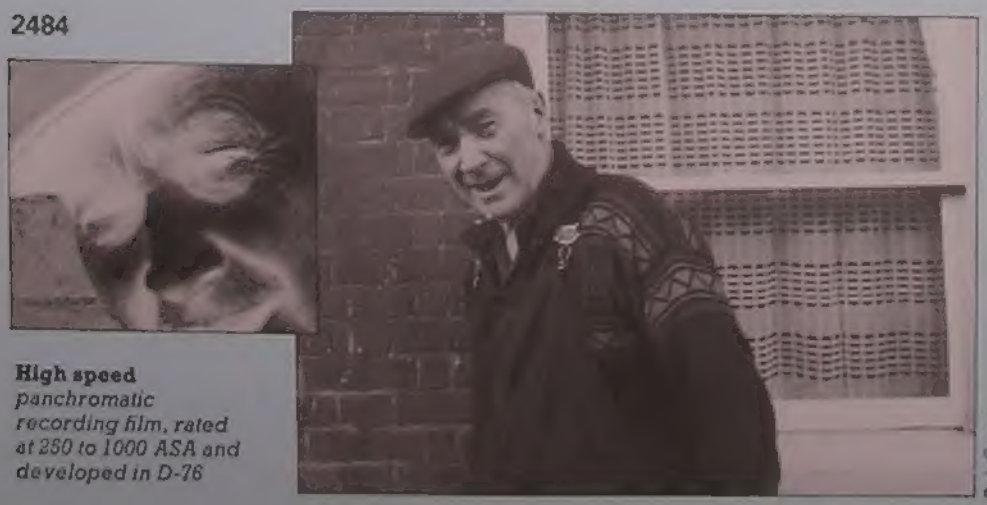
2495

Fairly grainy *rapid access ortho film, rated at 400 ASA and developed in HC-110*

2415

Technical Pan *film with extended red, rated at 25 ASA and developed in POTA*

2484



High speed *panchromatic recording film, rated at 250 to 1000 ASA and developed in D-76*

Bob Cross

tungsten lighting, but it is undesirable for portraits because veins appear unnaturally light or dark—in fact those people with veins close to the skin surface show particularly prominently.

Kodak's Technical Pan Film 2415 has extended red sensitivity with extremely fine grain and high resolution. Depending on the subject, it can be processed to a wide range of different contrasts by varying the development, though it is essentially a high contrast film. It is useful for slide-making, copying and personal microfilming. Some experts claim it is particularly suitable for astronomical subjects, including the moon and planets.

This film is so versatile that different applications are frequently discovered by users. It can be processed to give a wide range of contrasts, and effective speed ratings range from about 50 to about 125 ASA, so experiment is necessary for best results. The colour response is reasonably flat over all visible wavelengths to 690 nm. This means good mist-penetration qualities but poor flesh tones: the film is better for objects than for portraits of people.

The most exciting specialist film with unusual sensitivity is the infrared (IR) type. IR films are sensitive to blue light, because the makers cannot prevent this, but the dye sensitization extends through the visible spectrum and beyond to a wavelength of about 900 nm (the human eye can see up to 700 nm: see page 198). To achieve typical IR results, with white trees against a jet-black sky, a filter is needed to absorb most of the visible light, which would otherwise swamp the IR sensitization. For scientific work or forensic subjects, such as the detection of forgeries, an IR transmitting filter is used, but for pictorial photography a deep red will suffice. Kodak High Speed Infrared Film 2481 with an IR (87C) filter has a nominal speed of 10 ASA, which is slow. Using an ordinary red filter, however, the effective daylight speed is about 50 ASA.

Infrared radiation does not come to the same point of focus as the visible light for which the lens is corrected (see page 1620). Most modern lenses have an IR focusing mark which enables you to focus normally and then turn the lens to align the IR mark with the focused distance.

IR films are most suitable for landscape and when the sun shines. Portraits are not pleasing, because the veins appear to stand out. IR cannot penetrate fog, but it will pierce through a light mist. Blue sky records as black, against which clouds show startlingly white. Grass and trees record as almost white, because chlorophyll reflects IR. Snow, water and ice are recorded as very dark. Tonal renderings are changed and the exact results cannot be predicted. Processing is normal, except that heating radiators are best switched off while loading the film into the tank. In fact, any form of heat is a source of infrared and is, therefore, likely to fog the film.

Bob Croda

Very high speed *but less grainy than 2484. This film is rated at 1600 ASA and developed in HC-110*

Technical and recording films

IR films can also be grouped with the third broad film category—the technical and recording films. In fact, this category is difficult to define, and includes a large range of films that have a more general use. And there is no apparent connection between the intended use of a film and its index number. Kodak's 2497, for example, is a blue sensitive, high contrast, fine grain, high resolution emulsion on a polyester sheet film, whereas 2495 is high speed and orthochromatic with high resolution. Although a film title, such as Kodak Technical Pan, helps to identify the film, it is safest to know the complete description, just in case the film specification has been modified.

An important recording film type is described as Rapid Access Recording (RAR). In the Kodak range a fairly widely available example is Rapid Process Copy Film. This is intended for copying X-rays in hospitals, where results are required swiftly. The film is processed at temperatures up to 54.5°C to achieve rapid results—a development time of just a few seconds is possible. This rather slow film, sold in 35 mm cassettes, can be processed in ordinary paper developer, and gives a direct positive image with no reversal stage.

Also in the RAR category is 2495 film. This is processed in an active developer, such as D-19 or HC-110. Some specialist films need developers, such as DK-50 and POTA.

One type of recording film is extensively used for surveillance—Kodak Recording Film 2475, which is particularly suitable for shooting in dim interiors, floodlit arenas and under street lighting. It can be rated at speeds up to 4000 ASA with suitable development, but is very grainy and is unsuitable for portraits because of its extended red sensitivity.

Long duration exposures are essential for some types of astronomical subjects —such as faint stars and galaxies. Kodak's 103a-E is intended for exposures longer than 100 seconds.

For the amateur, specialist films can be too costly to use often. Even when some films are available from stock, they are expensive. Frequently, a photographer must load cassettes from a spool containing 15 m or 30 m of film. Load film yourself to cut costs.

Typical special effects *of infrared high speed film 2481, with light rendering of vegetation*

Tina Carr

Dumbell nebula *A photograph taken by an amateur astronomer through a 25 cm telescope using 103a-E film*

Walter Pennell

Assignment

Sports day

School sports days may appear to lack the gloss and glamour of top-class athletics meetings but, surprisingly, both must be treated in the same way

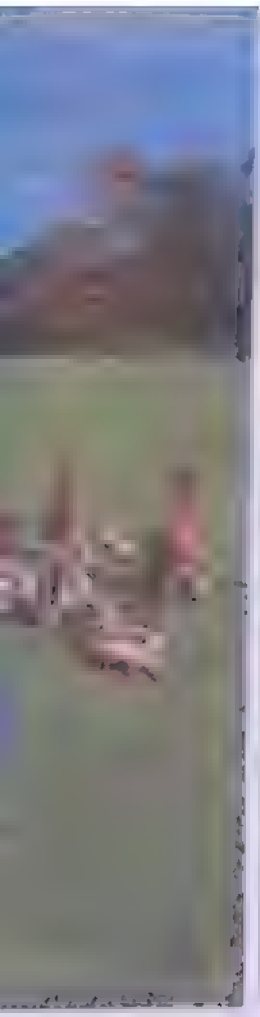
School sports day has the same appeal the world over, and offers a chance to photograph both the sports themselves and portraits of the children involved.

However, while the standards of the sports hardly compare with professional athletics, the photographic approach is largely the same in both cases—as professional sports photographer Nigel Snowdon found when faced with the challenge while on vacation in Australia. Nigel explained: 'As is true of almost all sports, the main thing is to capture the peak of action moments. Whether shooting a child at the high jump or sprinting along a track, you have to concentrate on what is happening in the viewfinder and on releasing the shutter just when the competitor makes an anguished expression or reaches the climax of the event.'

For the high jump, Nigel concentrated a boy or girl just as they were midway over the bar. For a sprinting event he prefocused his 180 mm lens on the finishing tape and pressed the shutter just as the winning group crossed the line at the end of the race.

Nigel added, 'I always feel that it is very important to vary the shots as much as possible at any sporting event. As well as these more obvious shots, I also looked for unusual views of what was going on. Isolating the row of legs poised for the start of a running race is one example of this. With the long jump I also tried a shot framing a young spectator in the foreground with a competitor and her shadow clearly visible and caught at the peak of the action. A shot like this gives the viewer something extra to look at and also creates a stronger sense of involvement and interest when looking at the shot.

In the bright Australian sunshine there was no problem with using fast shutter speeds to freeze the action—even though Nigel was using Kodachrome 64. Most of the shots were taken using his Nikon F2 cameras set at 1/250 or 1/500 second. Although he made use of wide angle lenses as well, Nigel found that his trusty 180 mm f/2.8 Nikkor telephoto was the most useful lens to have. It allowed him to close in on the action as well and create interesting shots out of details.



Wide view *The [illegible] of a 16 mm full frame fisheye lens [illegible] the wide panoramic view of the sports field.* **Striped vests** *A [illegible] was made by the professional [illegible] of the children and used his [illegible] millimetres to concentrate on this cheerleading group of girls [illegible] used for the occasion.* **Starting line** *A more unusual shot was created by using a 180 millimetre lens to record the row of [illegible] prepared for the start.* **Long jump** *Force perspective [illegible] the sense of [illegible] and space [illegible] depth.*

FULVIO ROITER

From a Venetian street to a bar in South America, Fulvio Roiter's photographic subjects are presented with clarity and force. His images bring out an exotic beauty in the simplest of scenes

Venetian café

Crestian Roiter told his father of the

mans his father was able to identify the officer in question. That evening,

ches. He commuted regularly fro home village into Venice, brin

published one of his phot
inspired him to ask his fat for one
more chance He borrowed a Rolle.
and
rode around Sicily for two months,
taking hundreds of photographs Some
were published, and from then on he
never looked back

A publisher in Switzerland, La Guilde du Livre, agreed to publish a book of his photographs of Venice Roiter recalls: 'I was lucky, because they did this purely on the strength of the pictures of Sicily. I didn't have a single one of my old Venice pictures left, but when they gave me a picture deadline, I worked night and day, and had 200 ready in time!'

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say in the l
printed next
then, and still does, that a ph
image should speak clearly
without the need for any words

Unusually for a photographer, Roiter works almost exclusively for books and, after the Sicilian book, his next project was *Ombrie, Terre de Saint Francois*, a book published in 1955 containing a dreamy, pastoral collection of photo-

Fulvio Roiter *'The important thing is that a photograph should speak clearly'*

Year
point in his life—he
nine month journey to Brazil for a book
he had been commissioned to do. This
was the first time he had ever left

distant views. The photographs
is over, and Venice is left behind
receding over the horizon.
The book has sold 250,000 copies
throughout the world. Ro
this above all to the use of colour—he
does not feel that black and white
photography has much commercial sig-
nificance—but also to the book's format:
it is elongated horizontally, to fit the

Masks [illegible]
[illegible] Leaves
[illegible]
striking shot. **Fireworks** *Take*
Venice festival—
exposure to produce

mentaries of certain
sensationalism. 'A dog with
mouth would bring back the

Bunch of dates [illegible]

Rice paddy [illegible]

No hurry [illegible] *photograph has a mood remin[illegible] Cartier-Bresson's work. The overall colour of the light is blue conveying the feeling of cool shade and the men's pensive mood*

[illegible] car shot quality [illegible] and the [illegible] images.

Roiter [illegible] for [illegible] tising campaign [illegible] for Renault [illegible] thought it [illegible] photography than car shots. But they seemed to think I was the right man for the job.

[illegible] and down Burgundy, looking [illegible] tions. I wanted to produce [illegible] agency—one of the three [illegible] being projected, when a secretary walked into the room. She gasped when she saw the photograph! That was the effect I wanted, so we chose that shot out of the three.'

This type of work, however, accounts for very little of Roiter's total output. He has never done any studio work, either. 'I am afraid of the degree of technique required to take photographs in a studio. I admire those who can, for instance, produce a stunning photograph of a couple of glasses, just through clever use of lighting, but I could never do that myself'. He also does a minimum of portraiture, con-

[illegible] intium case. He especially [illegible] the fast lenses made [illegible] Leitz [illegible] they all [illegible] When he [illegible] 64. In poor light, he [illegible] chrome 400, although h[illegible] poorer quality. When h[illegible] tripod, even with wide angle lens.

Recently, Roiter has becom[illegible] interested in photographing people and has published a book on the [illegible] carnival. The book is a collection of images which are both bizarre and nostalgic — the ancient traditional characters of the carnival set against the background of historic Venice. It is typical of Roiter's fascination with the exotic. A writer friend of his once said of him: 'The 20th century does not exist for Fulvio, he goes on his way, in search of a lost secret . . .'

Testing your enlarger

An enlarger and its lens are important parts in the making of prints. Poor quality components at this stage wastes the potential of top-notch photographs and equipment, so check your system with these simple tests

[illegible]

Very few enlarger lenses come close to matching the performance of even fairly modest camera lenses. Even if you do buy and spend as much as you can on a lens of the appropriate focal length (see pages [illegible]) it is rarely necessary.

Unlike camera lenses, enlarger lenses are designed for specific conditions of use. In a nutshell, they give their best only when used at a specific aperture and degree of image magnification, conditions of use which are clearly specified on top quality lenses.

Most 35 mm enlarger lenses—especially the cheaper ones fitted to amateur enlargers—tend to be designed for use in a magnification range of up to [illegible] 10, giving prints up to 25 × 35 cm. from the full area of a 35 mm negative. Lenses of slightly longer focal length 75 mm and [illegible] mm used for printing 120 size negatives may be corrected to [illegible] 5 magnification (or less, to give the same average sized enlargements.

If you regularly use roll and 35 mm formats, and you have enlarger lenses to suit both, you may find it worthwhile to run performance checks between the two at various magnifications, between the extremes you are likely to use. In this way you can be certain what each lens is capable of and whether or not it would be worth switching the lenses around at certain magnifications.

You may for instance find that a 50 mm lens gives better quality sectional enlargements than a 75 mm beyond a certain degree of enlargement. Conversely, the longer lens may be more suitable for mini-enlargements made from 35 mm negatives.

Even if you have only one enlarger lens, a test sequence can provide valuable information on what apertures as well as what degrees of enlargements give you the best quality prints.

It is well known that you should not use an enlarger lenses at its full aperture, because stopping down can improve sharpness quite substantially. Although in a practical sense this is largely the result of improved depth of field using smaller apertures can correct inherent spherical aberration. This is particularly the case with inexpensive enlarger lenses which are designed more with an eye on costs than performance. But if you stop down a lens too much diffraction effects reverse the trend and severe loss in sharpness occurs. Thus most enlarger lenses are designed for use in the middle range of apertures.

An f/4 enlarging lens may offer six or more click-stopped settings down to a minimum aperture of f/16. If you discount full aperture and use this simply for focusing—and discount the tiny minimum aperture—the four or so remaining settings still offer a seemingly worthwhile range. And you can easily test for yourself whether one of them proves better than the rest. You can also decide whether or not the improvement offered by one aperture justifies the inconvenience of a too long or too brief exposure offered by another.

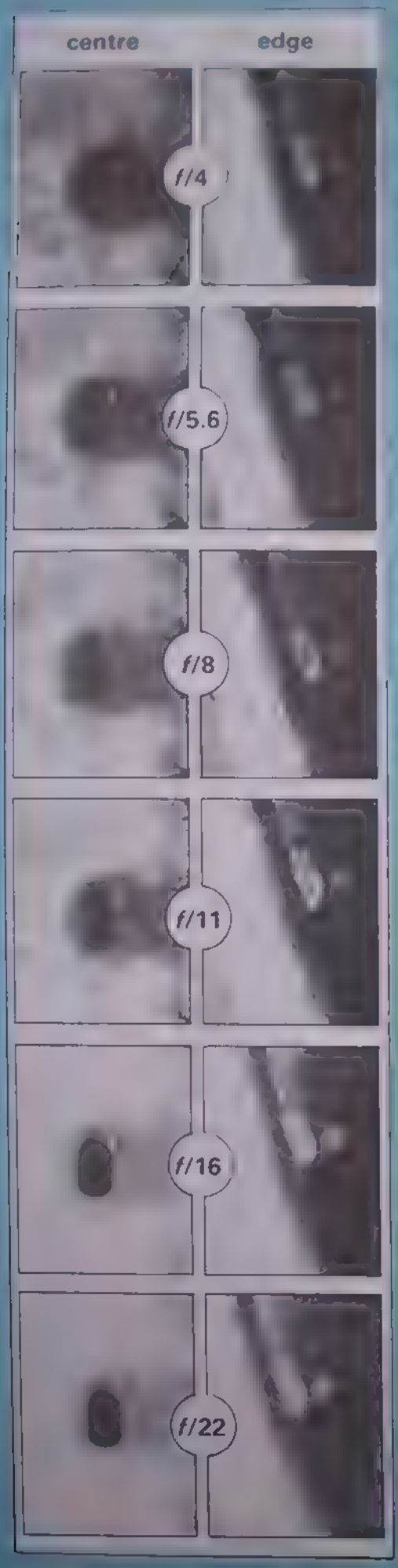
Test negative *A bitingly sharp image with a good range of tones makes an ideal test negative for evaluating the performance of your enlarger lens. Take test prints at each aperture to test both edge and centre performance, at the image magnification size you are most likely to use. The sequence right, printed at [illegible] 10 magnification but reproduced at [illegible] 20, shows how a typical enlarger lens offers differing standards of performance across its range, with the best quality in the middle of the range*

Testing procedures

Any test procedure is as much of a test of the system as it is of the individual component under examination. So, to be perfectly fair, especially if you are making comparisons between lenses, all possible variables must be kept as constant as possible—especially where exposure and processing are concerned. This is particularly true if you are conducting tests in colour. Make notes so that you can accurately record performances for future reference.

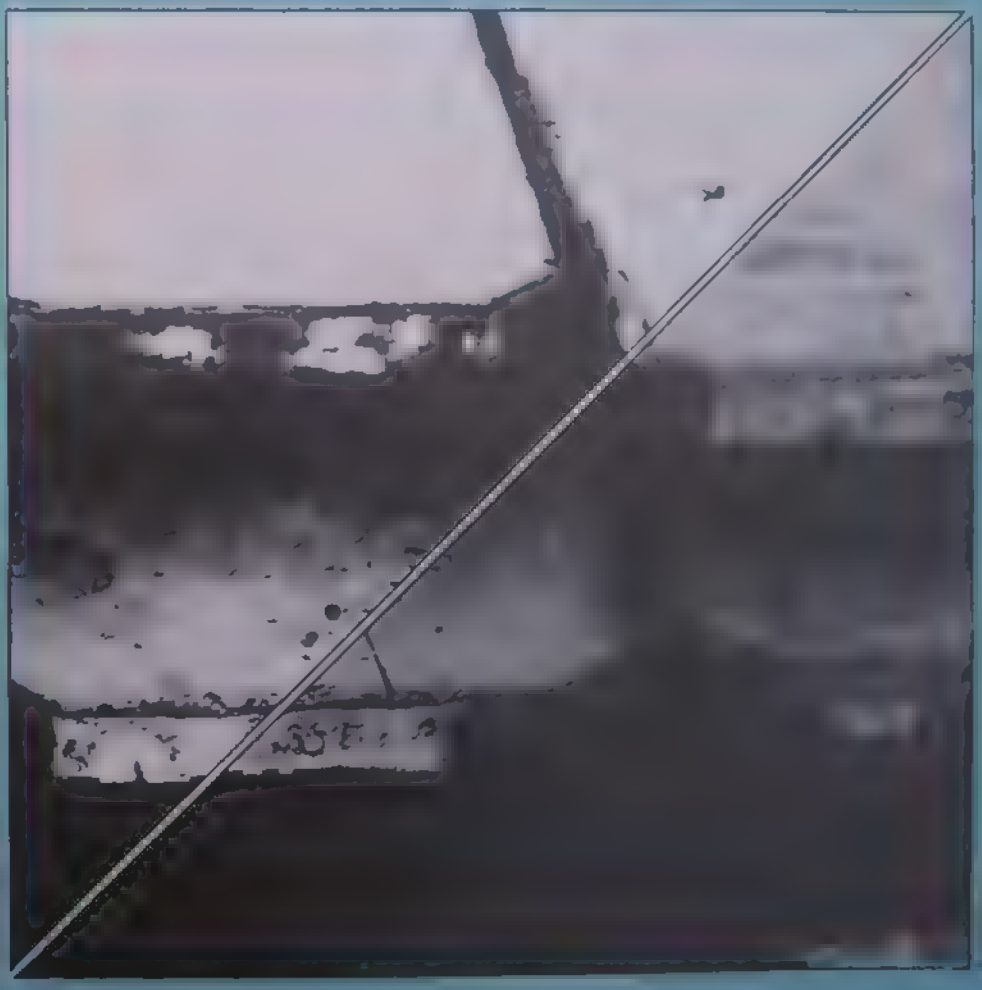
The test negative you use rather depends on what sort of testing you want to do. Any normal contrast—and sharp—negative is adequate for a general [illegible]

[illegible]



Interpreting the result

Contrast and sharpness *The impr[illegible] of image sharpness is heightened if you print on contrasty paper, or use a high contrast lens (left) rather than a high resolution lens (right)*



Chromatic aberration *If your enlarger lens produces colour fringes like those on the white gable, your lens has chromatic aberration—an uncurable fault that afflicts some enlarger lenses*

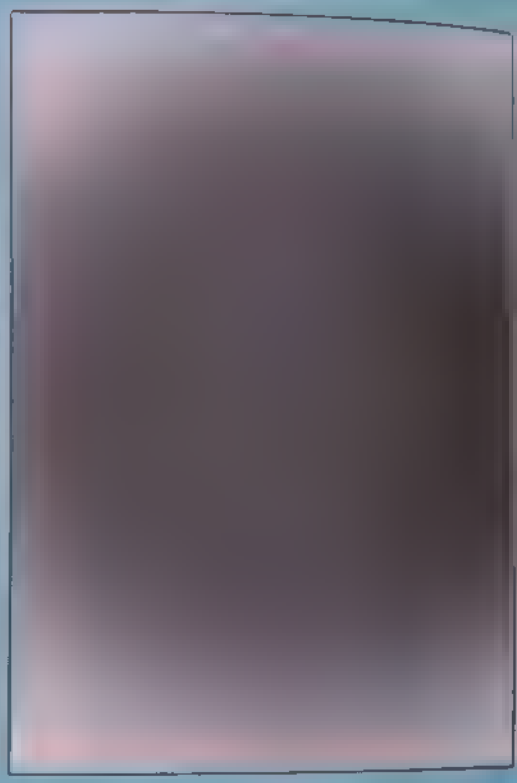
are all parallel to the enlarger [illegible] board as any [illegible] load to similar [illegible] middle [illegible] applies to lens [illegible] characteristics such as [illegible] of differing sharpness, which may vary according to the aperture used.

The impression of sharpness really depends on both the resolving capability or resolution of the lens and the image contrast it gives. Whereas resolution can be assessed purely on whether or not an image—even its grain—records sharply, image contrast cannot be judged quite so easily and objectively.

Other tests

[illegible]

[illegible] presence of [illegible] print exposures are made by adjusting apertures rather than exposure times.



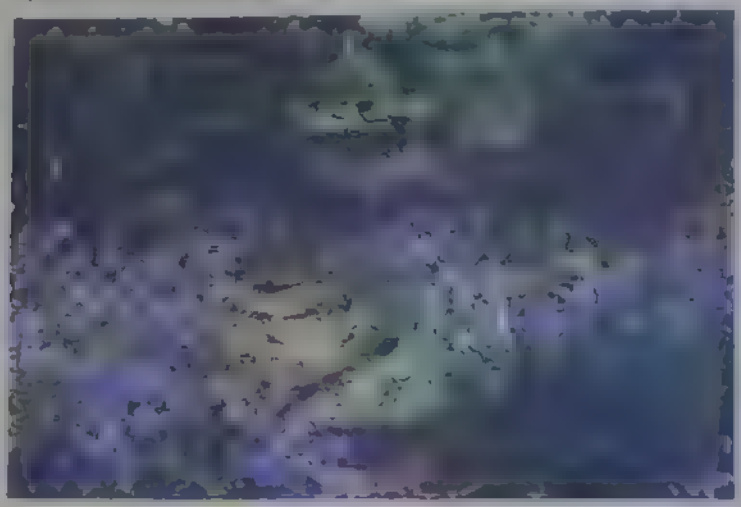
Test graticule *Although primarily intended for microscopy, a measuring stage graticule such as this one, with one millimetre in one hundredth divisions, makes an ideal test 'negative' for testing a lens's resolving capability. An enlarged scale is shown above*

Enlarger illumination

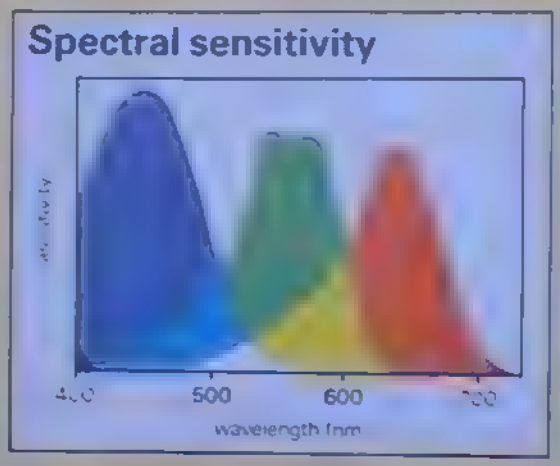
Understanding...

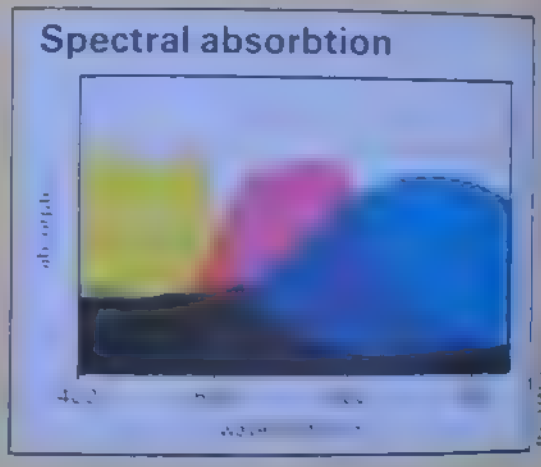
Colour response-3

With modern colour films the accuracy of colour response depends not only upon the sensitivities of the three emulsion layers but also upon the colour of the dyes that form the image



Bluebells *Because colour film has an added sensitivity to infrared, blue flowers can look slightly pink*





Wedge spectrograms *show the colour sensitivity of the three emulsion layers (left) and the absorption pattern of the dyes that form the colour image*

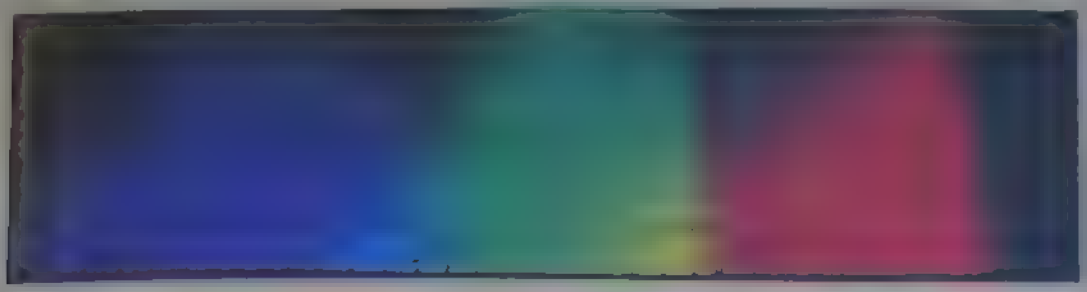
Spectral sensitivity

[illegible] film [illegible] ing the density [illegible] each layer [illegible] posures. The [illegible] gram shows how strong [illegible] film reacts to different colours or wavelengths of light measured in nanometres)

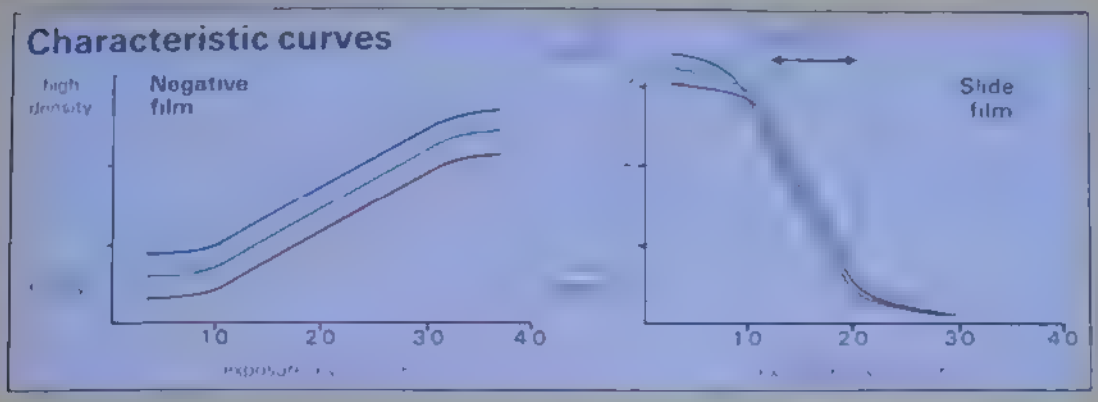
The characteristic curve for a colour film shows only the response of the layers to all colours of light; it does not show variations in response to individual colours in each of the layers. For slide film, [illegible] for all three emulsion layers, [illegible] that slide film gives. In the [illegible] sponse also fails at [illegible] exposures due to [illegible] bright highlights [illegible] facturers have attempted to keep colour response similar in all three layers because it is most noticeable here, but [illegible] is [illegible] three colours

[illegible] gives consistent colour within a narrow brightness range of

Leaves *Colour response* [illegible] between [illegible]



Colour wedge *The photograph from which a spectrogram is drawn. It was taken by photographing a spectrum through a grey step wedge [illegible]*



Characteristic curves *show the densities formed in each layer by various light levels. For both films, response in each layer is similar only within a limited range (the straight section)*

[illegible] the paper it must be [illegible] A point to bear [illegible] that the [illegible] must be similar [illegible] for the paper. It is [illegible] in the film and [illegible] in the print will be [illegible] This could give one [illegible] bias in the shadows [illegible] different bias in the highlights.

The most noticeable difference between the curves for negative film and the curves for slide film, though, is that with negative film the blue, green and red curves show different contrasts. Although ideally the green curve is higher up the [illegible] than the red curve and the blue curve is higher still. This is because the blue and the green emulsions must give denser images than the red to allow for the amber film base of colour negative film so that when printed, difference in densities is cancelled out by the amber film base (though sometimes it can lead to a red colour cast in shadows).

Wedge spectrogram. Characteristic curves show up some of the features of the spectral sensitivity of colour film but do not give the whole picture. The wedge spectrogram gives a different impression.

One feature that is immediately obvious on the spectrogram is the overlapping sensitivities of each emulsion layer. Thus the blue sensitive layer responds not only to blue and violet but partly to green, as does the blue layer responsive to green as well as red. And the green layer reacts to both red and blue. This is partly because of the deficiencies of the dye sensitizers and the yellow filter layer and partly because of the need to ensure full coverage of the spectrum.

The result is that colours are never pure—traces of other colours are always included. Since a mixture of every colour gives white, the effect is to desaturate colours, particularly greens. Sometimes manufacturers arrange for the three emulsion layers to have spectral sensitivities that give steep, narrow peaks on the spectrogram. This improves saturation for most colours but leaves a few colours poorly catered for.

One other defect in the spectral sensitivity of three-colour emulsions is the fact that emulsions respond to light outside the visible spectrum. While the sensitivity to ultraviolet light can usually be reduced by the use of ultraviolet filters, deep red and infrared light can be more of a problem. Blue flowers for instance usually reflect a little infrared as well as blue, so the flower is recorded not only in the blue

Robin Scagell

Spectral absorption

[illegible]

Creative approach

Water

Whether the subject is a magnificent lake at sunset or a street puddle in the pouring rain, water can be an impressive element to include in your photographs

more important to think
You must use all the skill you have to capture in a still picture something which dynamic and liquid

Think, for example, of a waterfall. The beginner will simply click the shutter at some average speed, but the more experienced photographer will make a decision at this point—is it best to 'freeze' the water with a rapid shutter speed, or to allow it to flow for a long exposure? In practice, if you are close

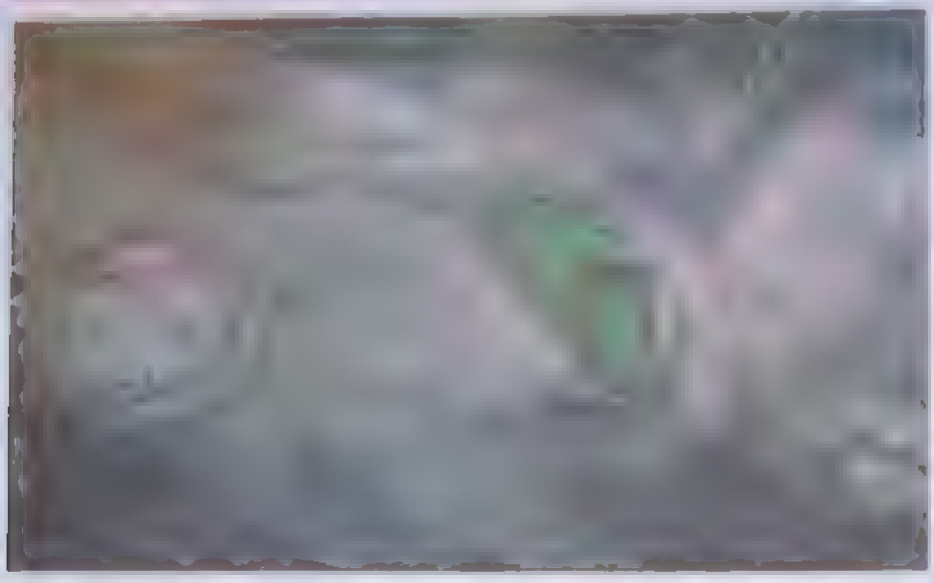
were there but somehow the lopsided There is often a balance with waterfall pictures—you have restricted access, and there may be deep shadows which create disturbing black areas. The waterfall, seen from a bank, tends to fill one side of the picture with nothing on

Industrial scene *By including such a large expanse of water in the foreground the photographer has avoided concentrating too much upon a mirror image. The evening light produced colour in the still water*

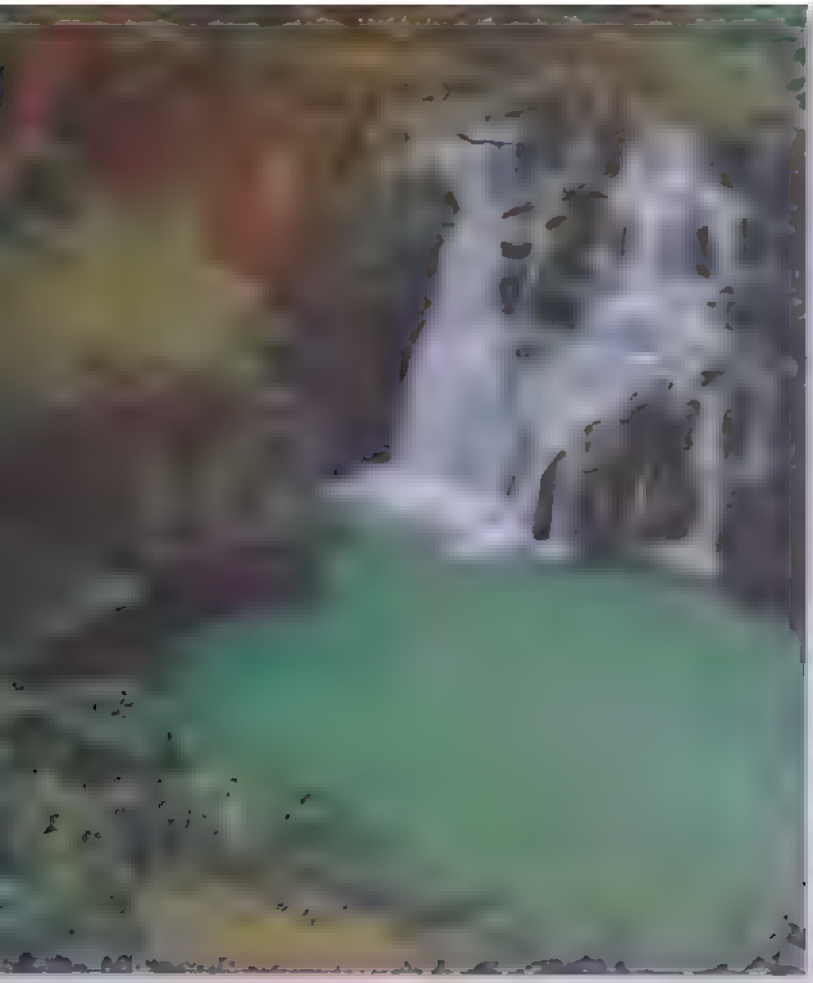
Swimming pool *The patterns of the sunlight reflected in the water and the way the water distorts the squared tiles on the pool floor produced striking results. Often it is worthwhile showing just water, leaving out all else*

Brazilian waterfall [illegible]

[illegible] to impede its progress. Little eddies and splash points can be isolated to capture [illegible] feel of movement where an overall [illegible] might be too confusing. Shooting



Oily rivet Often there is potential subject matter floating on the surface of water. Here the [illegible] echoed the way the oily trail curved around the plant and framed the shot to concentrate on its structural detail. **Walking in the wet** After a fall of rain a city can take on a new look. In this shot the reflections mirror the vertical lines of the building continue down the full length of the frame creating a striking graphic effect which makes an impressive framework for positioning the people. **Forest dawn** A mysterious atmosphere has been established by photographing this scene in the early morning mist, highlighted by the sun. The water in this shot has mirrored the undergrowth emphasizing the density of the forest. **Wet close-up** By closing in on the water droplets clinging to these blades of grass, the photographer has produced an intriguing, almost abstract image. Shots like this usually work best when photographing the subject against the light. **Java salt pan** Water always multiplies the effects of dramatic skies—the two together also create a bright background that lends itself to framing a scene with a silhouetted subject. A graduated filter has added colour to the almost monochrome scene of the salt worker. The exposure reading was taken from the brighter areas of the scene to create the silhouette.



Waterfall [illegible] *contrasting with the hard shapes of the surrounding rock* **Fountain** *In contrast a faster shutter speed has been used for this shot so that the water issuing from the fountain has made trails in mid air. For best effect a shot like this should be composed so that the trails of water are backlit*

[illegible] colour instead. As the water ripples depend on the breeze, the shape of the reflection changes a great deal, and you may find, in a comparatively short time, that you have a whole series of different pictures taken from the same patch of water.

The time of day and the type of weather can alter the appearance of any kind of water most dramatically. Late evening, in particular, can transform a dull waterside scene into a romantic or mysterious image simply by the quality of the light. A dull, muddy river might become a bright ribbon of gold while a tiny pool can be turned into a patch of light bringing relief to dark, rolling hills and a menacing sky. The colours of the sky may be richly saturated, reflecting into the water, and cloud formations may be lit from below, giving vivid reflections.

Evening light can pick up every detail and ripple in the water, and it may be worth exploiting these effects with the help of a telephoto lens. Use any foreground details in the late afternoon and evening, especially silhouettes which can provide a positive contrast to a exploit colour contrast, using bri[illegible] dressed children skating on the ic[illegible] contrast to the white surface of the w[illegible] Whether it is spring or autumn, do not overlook colourful blossom or dead leaves which may have fallen into the water from adjacent bushes and trees. When photographed at close range, these provide bright contrasts with the tones of the water on the bed below.

What went wrong?

Photographing friends

Homer Sykes offers his critique of three amateur photographs of friends and explains why there is room for improvement in each case

There are four main reasons why this photograph does not work as well as it might. The first is simple—it is [illegible] overexposed. The second 'mistake' is the fence. This is rather ugly, as the strong diagonal bars dominate. I would have moved the subject away from the fence and used a tree as a prop, perhaps leaning the girl up against it. There is a rather unfortunate branch apparently growing out of the girl's head, which could easily have been avoided. Lastly, the photographer has not decided whether he wants a full length or three-quarter length portrait.

The photographer has used imagination and decided on a [illegible] this man in his Arran jumper. [illegible] is an uncomfortable [illegible] have a very large [illegible] top of the trousers in the picture. This would [illegible] dominance of the Arran jumper and told us mo[illegible] subject. The framing could also be improved by moving lower, to include all the man's hand and elbow and remove the telegraph lines.

This rather charming photograph of the child and dog could have been improved in several ways. The most obvious would [illegible] tends to lack that essential spark which turns an attractive shot into a clearly recognizable prizewinner.

Assignment

Streets apart

Comparing an old print of an area with the way it looks now can make an interesting assignment and, as Homer Sykes shows, prompts a range of ideas

Homer Sykes

Tower blocks

Young couple

555

Remote control equipment

[illegible] there is no way you can remain behind the camera to press the shutter. The [illegible] remote control equipment is invaluable

Conventional releases *are either cable, electric or pneumatically operated*

[illegible] and using a tripod. The problem becomes more complicated, however, if you need to be away from the camera, holding or manipulating equipment while the picture is taken, or if you wish to take candid shots or photograph shy wildlife at close range. In this case, various long distance triggering systems are needed.

Cable releases

[illegible] least expensive [illegible] as the conventional [illegible] These are available [illegible] a wide range of finishes—including fabric and clear plastic—and vary in length from about 250 mm to more than a metre. The shorter ones—costing little more than the price of a 20 exposure print film—are intended purely for long exposures when the photographer is close to the camera. If you buy one of these, make sure it flexes easily so that there is no chance of vibration from your hand being transmitted through the release to the camera. Some releases,

Pneumatic releases

[illegible]

Electric release *This is merely a length of twin-core flex and a simple switch, used to extend the triggering circuit of a motor drive or auto winder*

Remote control equipment

For some shots, there is no way you can remain behind the camera to press the shutter. On such occasions remote control equipment is invaluable

Conventional releases *are either cable, electric or pneumatically operated*

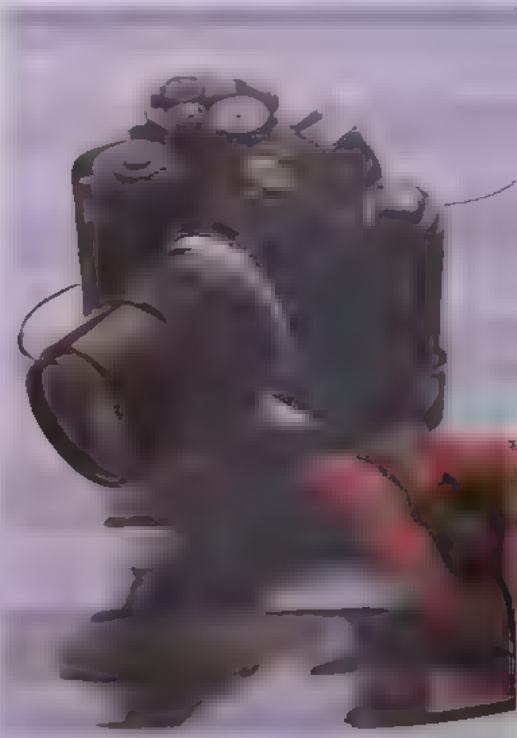
There are many types of shots that cannot be taken by merely pressing the shutter release button on your camera For these occasions, you must use some kind of remote control device Some are available as stock items but others must be improvised

At the simplest level, a remote control device, such as a cable release, helps to avoid camera shake when giving exposures longer than 1/60 second using a tripod. The problem becomes more complicated, however, if you need to be away from the camera, holding or manipulating equipment while the picture is taken, or if you wish to take candid shots or photograph shy wildlife at close range. In this case, various long distance triggering systems are needed.

Cable releases

Perhaps the simplest and least expensive remote control device is the conventional cable release. These are available in a wide range of finishes—including fabric and clear plastic—and vary in length from about 250 mm to more than a metre. The shorter ones—costing little more than the price of a 20 exposure print film—are intended purely for long exposures when the photographer is close to the camera If you buy one of these, make sure it flexes easily so that there is no chance of vibration from your hand being transmitted through the release to the camera. Some releases,

Pneumatic releases

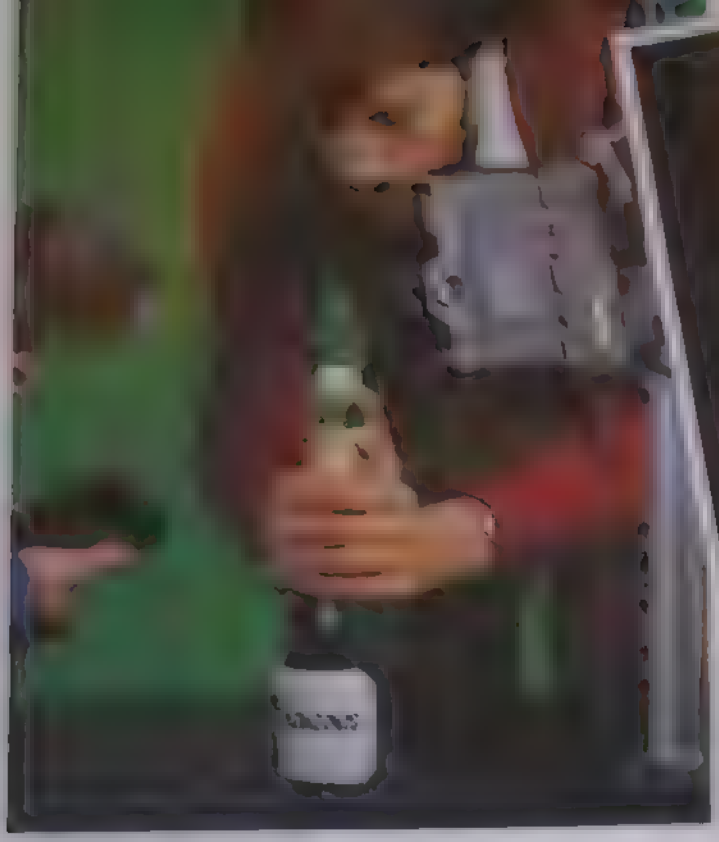


Electric release *This is merely a length of twin-core flex and a simple switch, used to extend the triggering circuit of a motor drive or auto winder*

Electrical triggering

A pneumatic release is particularly suitable for taking self portraits or operating the camera while you are manipulating equipment in the scene. An electromagnetic plunger (below) gives you just as much freedom away from the camera, but it is more elaborate and expensive

An ultrasonic trigger has no connection between the camera-mounted and hand-held units, but its range is limited to the size of a large room



[illegible]

[illegible]

Sezóna-sportovní tempo

[illegible]

Dobrovolné tempo

[illegible]

Radio control

Light-operated switch

Infrared triggers *are now commonly available. Contax were among the first manufacturers to build these devices, a current model has two channels*

Ultrasonic triggers

Improvised trigger *A typical announcer/alarm system transmits infrared beam pulses, which are reflected back. If the beam is interrupted, a 12 volt output triggers a motor drive by means of a relay (inset)*

Pinhole pictures

The pinhole camera is the simplest of all optical systems, and is easy to make. It is more than just a novelty, too—it can be used to take pictures which would otherwise need expensive lenses

[illegible]

Daffodils *Pinhole optics, used here on 35 mm Agfachrome, have infinitely wide depth of field—or, alternatively, the definition is equally bad at all distances The pinhole was 14 mm from the film for this shot*

[illegible]

The camera body

Although the built-in pinhole camera is a small home-made box it is certainly far easier to use an ordinary camera body for straightforward pinhole shots. Simply remove the lens and replace it with a home-made pinhole and expose in the normal way. This gives you a guaranteed light-tight body and enables you to load the camera without retreating to the darkroom. A normal camera body is also far easier to work with.

The disadvantage of a standard body is that you cannot take wide-angle shots. The problem lies with the thickness of its body (about 1 mm). With the pinhole in position flat on the camera's lens throat, it will give an angle of view similar to that of a 50 mm lens. Only by placing the pinhole closer to the film can a really wide angle be achieved. But unless your camera has a mirror lock you cannot do this.

A 35 mm rangefinder camera has a thinner body and no mirror. With its lens removed, a pinhole in a sunken mount can be pushed inside the throat to within a few millimetres of the shutter blinds, though if it is very close, the throat will restrict the field of view.

Both the SLR and the rangefinder bodies have built-in focal plane shutters. This makes exposing the film convenient and fully controllable. However, exposure times with pinholes are often very long—several seconds is common—so a shutter is far from essential. Other less sophisticated camera bodies without shutters can be used very successfully. Old, broken folding camera are particularly [illegible] With the lens bellows [illegible] removed you are left with a very [illegible] body and [illegible] to place the pinhole as close to the film as you [illegible] before starting such a drastic modification make sure that the camera is expendable and that it [illegible] The [illegible] of [illegible]

Other cameras worth considering for similar treatment include peel-apart Polaroid and 126 cartridge-load types. The 126 cartridge can even be used on its own providing a light-proof panel or box is fitted to the front.

All sorts of boxes and tins can be used to form the basic body. A round biscuit tin cut in half across the diameter makes an ideal basis for a panoramic camera. All you have to add is a front panel with a pinhole in the middle. For really huge pictures try a plastic dustbin!

Great precision is never required in any of these constructions. [illegible] and hardboard are [illegible] make the camera light-tight [illegible] all joints with adhesive tape. [illegible] base of your 'biscuit tin' [illegible] allows you to fix the camera [illegible]

Home-made cameras have [illegible] in a darkroom or changing bag [illegible] want the freedom to take [illegible] pictures [illegible] that [illegible] have a chamber big enough to accommodate the camera and two light-proof containers—one for [illegible] and one for unexposed material.

Choosing the film

The best type of film to use for home-made pinhole cameras is sheet film, as this is easiest to handle. It is available

[illegible]

[illegible] Exposure and filtration are best determined by a practical test. Take exposure meter readings at the same time and record all data. Once you have achieved a good result you can relate meter reading to actual exposure given for future reference. Printing paper should be processed promptly.

Making the pinhole

Once you have decided on the size of camera and the angle of view, you can set about making the actual pinhole.

For every pinhole-to-film distance (the equivalent of focal length in a lens) there is an optimum size for the hole. Make the pinhole larger than this size and the image becomes brighter, but less sharp. Make the hole smaller than the optimum and sharpness still deteriorates due to diffraction and the image gets darker. Details of the calculations involved and a list of optimum sizes is given in the 'Optimum pinhole size' box.

The hole should be perfectly circular and made in very thin material. The edges of the hole must be free from all fibres or fragments. Black card can be used, pierced with a hot needle to burn off any fine fibres at the edge of the hole. But metal foil is a better material to work with.

You need, in addition to the foil, scissors, centrepunch, a small hammer, a whetstone, a fine needle, and a flat piece of wood or metal with a hole about 6 mm across in it.

Cut a piece of foil about 20 mm square. Place it over the hole in the wood and tap it gently with the centrepunch. Use only enough pressure to make a shallow dent in the middle. Gently rub the 'bump' side of the foil in the whetstone to reduce its thickness. Push the extreme point of the needle into the centre of the dented surface to make a minute hole. Turn the foil over and push the needle in from the other side, rotating it slowly. Keep the needle upright and use minimum pressure.

You now have to measure the diameter of the hole to establish the taking aperture. This is best done with the aid of an enlarger. Tape the foil to a slide mount and place it in the enlarger. Focus the image of the hole using the

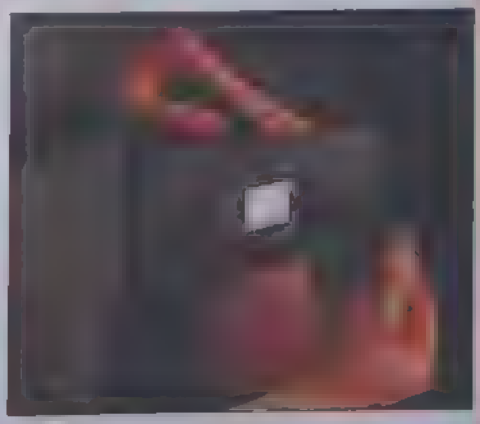
1 A round biscuit tin can be turned into a good panoramic pinhole camera. Begin by cutting the tin in two using tinsnips, as shown here

2 The inside of the tin, including half the lid, should be painted matt black. This paint is sometimes called 'camera black' or blackboard paint

3 Make the front of the camera from stout black card. It can be stuck on using black carpet tape, which also forms the hinge for the lid

4 The pinhole must be made in a very thin material. Baking foil is often used, as it can be taped to the centre of the card camera front

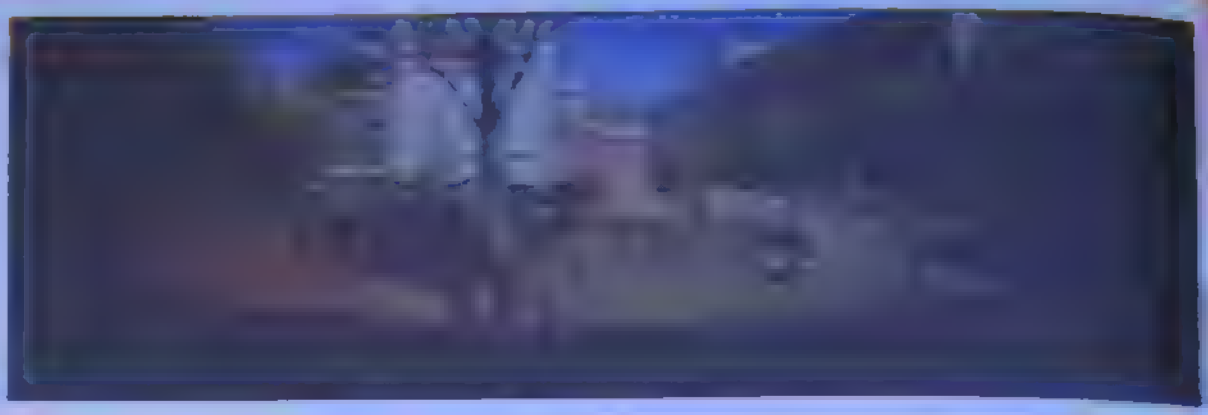
5 In the dark, tape a sheet of photographic paper (emulsion outwards) to the curved inside of the camera. Tape the lid on securely



6 The shutter is simply a piece of black tape, stuck back to back at the centre to prevent it from damaging the pinhole. Use a secure base

Dave King

Panoramic pinhole



Viewfinder

Exposure techniques

Derek Dodge

Sprocket shot
If you use 35 mm film the image will overlap the sprockets and edge markings. Rather than crop these out during printing, you can include the full area to produce an unusual and interesting image. This picture is of an interior and without a pinhole camera, would have required a fisheye lens for the same coverage

Multiple images

Abbey ceiling

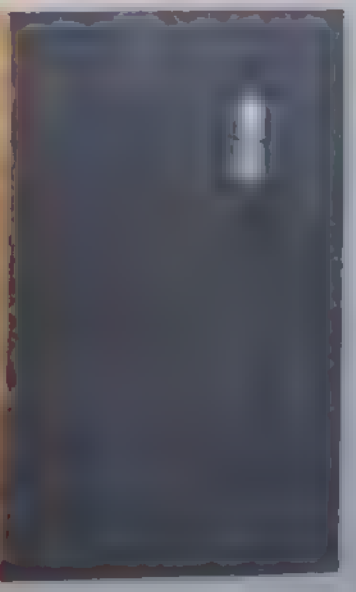
Understanding...

Colour masks

Every photographer who uses colour print film regularly is familiar with the characteristic orange colour of the negatives—but just why are they this colour?

Integral negative masks

Green apples



Steve Marshfield

Red letter box *Look at the cyan image of the red letter box—it has a trace of yellow from the magenta layer mask, because the magenta dye has not been formed in this area*

Sunshade *For reproduction, masks can be made to correct over dark blues in slides*

neutralize the blue

In the magenta layer, areas where the magenta image dyes form absorb a little blue yet they should only absorb green light (see page 1940). The integral mask introduces a pale yellow filter that absorbs exactly the same amount of blue into the areas where the magenta dye has not formed. This means that the magenta layer absorbs blue evenly—so the magenta image does not affect the blue any more than the rest of the picture. The overall reduction in blue is compensated for by increasing the blue sensitivity of the paper.

In the cyan layer, which absorbs both unwanted blue and unwanted green, the mask must add not only a yellow filter (to absorb blue) in the areas where the cyan dye has not formed but also a magenta filter to absorb green. The magenta in this mask must be slightly stronger than the yellow and the mixture of magenta and yellow is effectively pink.

So the colour negative includes not only the three image dyes, cyan, magenta and yellow but also a yellow mask in the magenta layer and a pink mask in the cyan layer. It is the combination of the yellow mask and the pink mask that gives negatives their distinctive and [illegible] colour.

If you look closely at a suitable colour negative, you may notice that the amber cast is absent in areas of pure magenta dye and pure cyan dye. This is because these areas do not need masking—they already carry the unwanted absorption.

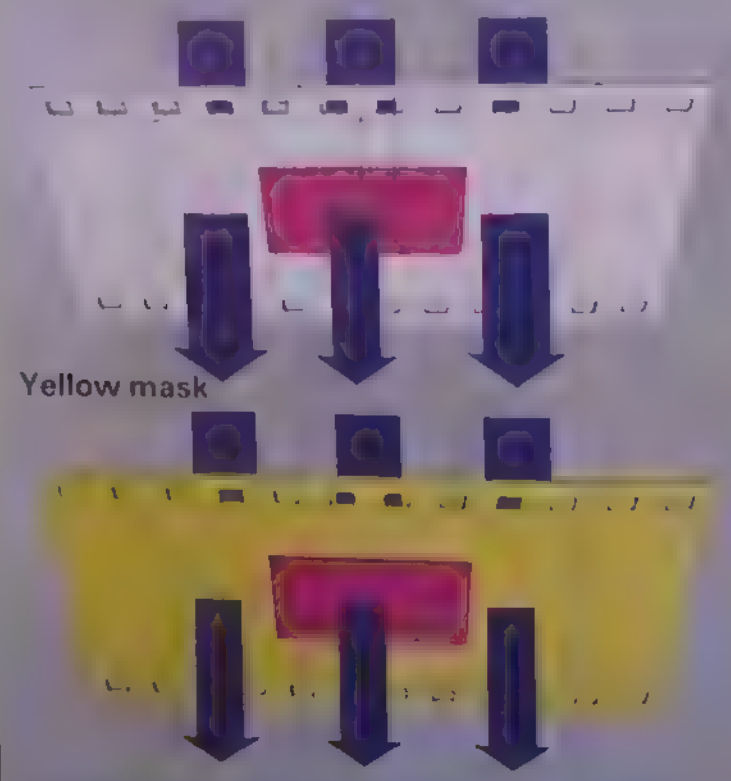
The masks are formed by using the colour couplers incorporated in the emulsion to form the image dyes. In colour slide film, the colour couplers are colourless; in colour negative film, they are dyed the colour needed to make the mask. The colour couplers in the magenta layer are therefore yellow; [illegible] in the cyan layer are pink. When the film is processed, the colour couplers form magenta and cyan dyes in the appropriate areas and disappear; in areas where the magenta and cyan dyes are not formed they remain to give the masks.

Slide masks

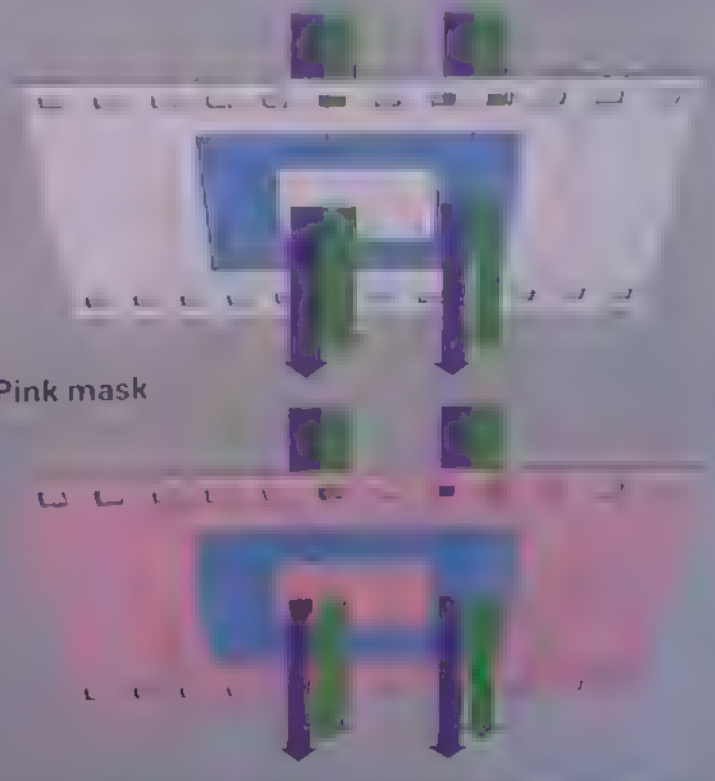
[illegible] to the overall pink mask of the [illegible] negative slide [illegible] when separation negatives are made for reproduction in [illegible] can be used to give the [illegible] degree of correction. Essentially they work in the same way as the integral masks but use a combination of negatives and positives.

When the separation negatives are made on black and white film, the green negative records all the magenta dye areas in the slide original and the red negative records all the cyan areas. If positives are made from both the red and the green separation negatives, the result is a silver 'mask' for both the clear areas of the magenta layer and the clear areas of the cyan layer. If these positives are made of a suitable strength, they can be used in combination with the green and blue separation negatives to balance out the unwanted absorption of these colours. In this way, the worst dye deficiencies can be effectively corrected.

Integral masks for colour negative film



Yellow mask *The magenta dye should only absorb green, but it absorbs some blue. A pale yellow mask in non magenta areas absorbs blue equally and neutralizes the effect*



Pink mask *The cyan dye absorbs considerable green and some blue. To correct this, the mask must be pink—that is, magenta (green absorbing) and yellow (blue absorbing)*

Roy Williams

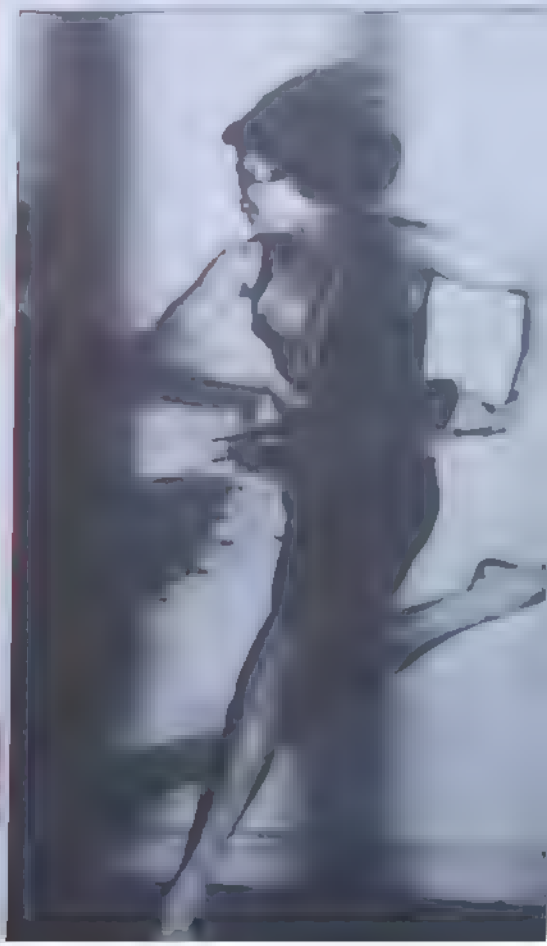
Dance

Photographing staged classical or modern dance is far from simple, but many creative studies can be found in this vivacious art form

Pas de deux [illegible]

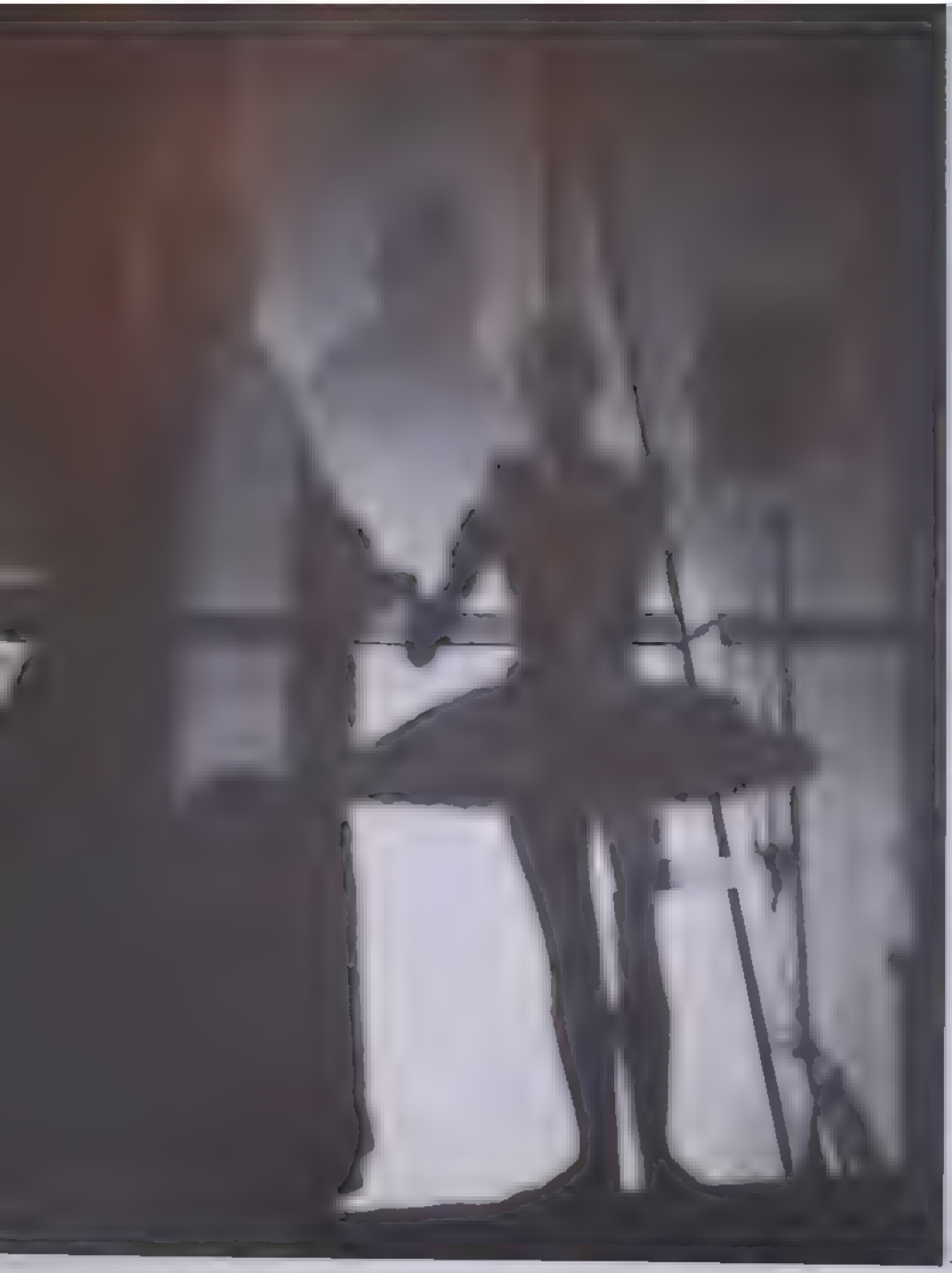
John Stern

At the bar *TTV testing a slow shutter even for a slow moving exercise – notice the effective shadow on the wall behind* **Claire Bauroff, Berlin 1931** *The strong impression of movement is given by the diagonals and the disappearing shadow*

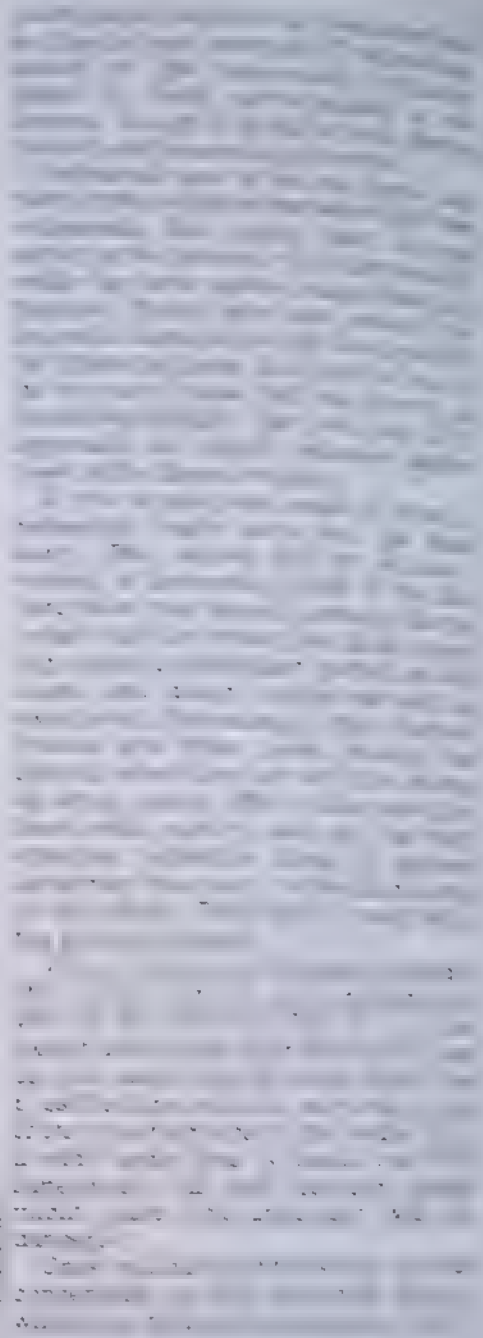


On point The tens[illegible] dancer's feet are [illegible]
At rest [illegible] give [illegible] at birdlike impre[illegible]n of lightness—note the grace of the [illegible]
Sitting Soft focus enhances [illegible]

stage. Furthermore, wi[illegible] a pose for a spot [illegible] you have more



Shadows *By photographing only shadows you can produce ghostly images like this backstage glimpse*



Backstage *It can be revealing to catch dancers in natural poses—these girls are waiting for their cue to go onstage*

light from the stage

Rehearsals and classes

Moment of tension *Waiting for the moment of maximum effort can produce expressive studies of movement*

In mid air *Dancers [illegible] leaps [illegible] the [illegible] in the [illegible]*

Making calotypes

The calotype process was developed as long ago as 1841, but calotype prints made by following original procedures can be particularly attractive

A calotype is a paper [illegible] with an emulsion that you make [illegible] yourself. The [illegible] process was developed by Talbot in 1841 but you can recreate his early experiments to produce [illegible] an alternative to modern [illegible] attractive [illegible] of these pioneering pictures.

The bigger you make the original calotype negative the better the image quality will be, so a plate- or view-camera is necessary for making the exposure. Bright sunlight is also essential for the exposure since the emulsion and paper are slower than modern materials.

The calotype negative can be contact printed on to ordinary bromide or RC paper, but, with the formula given below, you can coat your own salt paper to give your prints even more of a 'period' look. The first step, though, is to make the paper base.

The paper base

It is important to use top quality paper for making calotypes. Virgin wove that is acid, alkali and bleach free has to be used. Although coarse fibred recycled paper may seem satisfactory, it contains chemical impurities which interfere with the calotype process. Paper with good wet strength is essential.

The ideal paper if you can find it is 'rag weave gelatin' which contains a high proportion of gelatin. This prevents excessive absorption of chemicals. Other forms of hypo-free, chemically inert paper can be obtained from art shops [illegible] the emulsion surface lightly with g[illegible] hands. Then add table salt—at the rate of 17 grams per litre of solution—to the [illegible]

Exposing a calotype *A typical exposure time for a calotype is five minutes at f.22 in bright sunlight. The result of this exposure is shown above*

Dave King

Coating the emulsion

Absolutely clean di[illegible] polythene [illegible] or red safelighting [illegible] used this [illegible]

Start by cut[illegible] your paper to a size slightly bigger than is needed for the [illegible] wish to shoot or print [illegible] the top right hand corner [illegible] you can identify the [illegible] darkroom in the [illegible] film. Prepare enough paper to make up a batch.

The coating itself is done in two st[illegible] First you apply a silver iodine coat to one side only (it is important t[illegible] the back clear). When this ha[illegible] coat the sheet with gallonitrate solution.

To prepare the solution for the first stage of the coating, dissolve 2 g silver nitrate in 50 ml distilled water. Use a good quality brush to coat this solution evenly on to the paper. To avoid later contamination—and possible cleaning problems—you may prefer to use clean cotton wool pads throughout instead. Pushed into the o[illegible] polythene laboratory tu[illegible] are known as buckle brushes. Simply replace the used cotton wool [illegible] each coating application. Lay the coating evenly or patchy negativ[illegible]

Use blotting paper to remove any [illegible] before leaving the paper to dry—[illegible] blotting paper on [illegible] sion. You may find it worthwhi[illegible] the room—or fan the print itself from a distance with a hairdryer—to speed up drying.

When the nitrate coated surface is touch dry, immerse the paper for about 14 minutes in a bath consisting of 20 g [illegible] they may result in staining.

Preparing a calotype negative

1 *Though you can use hair brushes for coating and processing operations buckle brushes—made by stuffing cotton wool in to the end of a tube—are better*

2 *Cut paper slightly larger than needed and rule off the final trimmed size. Coat the paper with silver iodide solution, blot it and leave it to dry*

3 *When touch dry immerse the paper for [illegible] minutes in a pot[illegible] solution. Then thoroughly wash the paper and leave it to dry in darkness*

4 *Under red or amber safelighting, coat the paper with the gallonitrate solution. Pre-exposure to sunlight can be given to increase sensitivity*

5 *Give the sensitized calotype paper a brief wash and then lightly blot it. Keep the paper cool and in darkness until it is used*

6 *Before use—and under safelighting—trim the sensitized paper to the required size. The emulsion side is delicate when wet so handle the paper carefully*

The emulsion now undergoes a chemical exchange (redox reaction) to leave potassium nitrate and silver iodide.

Carefully transfer the paper to a wash and change the water at least once every five minutes and leave it to soak for about two hours. This removes the potassium nitrate and leaves behind the silver iodide. The paper is now light sensitive to a degree, so drying and storage should be carried out in total darkness. For convenience, let the treated paper air dry overnight. Blotting off excess water after the wash helps to speed up drying and reduces mottling. To reduce curling, weigh down—or pin down—the paper edges.

Inspect the dried, *iodized* paper for imperfections by holding it around 1½–2 metres from the safelight. Discard any sheet with pinholes, stains or patches in the coating. Only sheets which are completely free of blemishes are worth keeping for the second coating stage. Store the iodized paper in a cool, dry, dark place until you are ready to give the second coating, shortly before making your exposures. Fortunately, iodized paper has good keeping properties, [illegible] when kept cool and dry.

Second coating

Before the second coating you can increase the sensitivity of the paper by exposing it to direct sunlight for 5 to [illegible] minutes. This is rather like pre-[illegible] for 'flashing' film to increase speed and is called *hypersensitizing*.

Next, prepare the silver gallonitrate solution. This is made in two parts which are then mixed together and diluted for subsequent use.

To make the first part, dissolve 2 g of silver nitrate in 20 ml distilled water and stir in about 3 ml acetic acid. To make up the second part, which is a saturated solution of gallic acid (not pyrogallic acid), simply add gallic acid powder to 25 ml distilled water, stirring briskly but avoiding splashes. Saturation point is reached when a precipitation starts to appear in the bottom of the mixing vessel. Let the solution settle and then pour off the saturated gallic acid, which you will be using.

Just prior to exposure mix a small amount of the two solutions in equal proportion. This mixture may be diluted by as much as 1 + 4 with distilled water for spreading on the iodized paper. By experimenting with the concentration [illegible] coating.

Wash the sensitized calotype paper for one minute and then lightly blot. Then [illegible] calotype to fit the darkslide of your camera. Feed the calotype, emulsion side out, into the darkslide—the calotype is particularly delicate in a wet state, so take care when doing this. As

Processing and printing a calotype

7 *Calotype paper can be loaded in exactly the same way as cut film. To identify the emulsion side a pencilled 'X', or notches cut in one edge, are useful*

8 *Under safelighting, develop the exposed calotype by brushing the paper first with silver nitrate then with gallic acid from the gallonitrate mixes*

9 *Next, give the paper a short wash before fixing the image in plain non-hardening 'hypo' solution, following with a long wash*

11 *Place the calotype negative in contact with a sheet of salted paper (or ordinary print paper), with the emulsion sides together, the calotype nearest the glass*

12 *Take the frame in to daylight to make the exposure. Its progress can be checked from time to time by lifting one corner, but in the shade*

13 *After exposure, return to darkroom lighting and remove the salted paper from the frame. Wash the salt print in water, and then fix it*

Dave King

you may risk scratching the calotype with the darkslide blade do not replace this Instead, load the darkslide directly in to the camera you are using—this should not prove difficult, or messy, under normal safelighting

You must work in this rather odd way because exposure is made while the calotype is still wet and at its most sensitive. To get round later focusing problems, preset and lock the focus and aperture on the lens before taking the camera into the darkroom to load You then need only return the loaded camera to its tripod and make the exposure.

If you are recording several images, keep the remaining calotypes cool between final coating and exposure since heat will cause fogging

Exposing the negative

Exposure of a calotype negative is by trial and error as no two calotypes behave in the same way. For instance, try exposures of up to one minute at f/8 in bright sunlight—but be prepared for very much longer exposures in overcast or shaded situations. The ideal is a very faint image that is just barely visible on inspection after exposure. If the image is any more than a faint image outline then the negative is overexposed and will be too heavy when developed Examine the calotype in the shade—not sunlight—or fogging will result

Use fresh calotype paper rather than attempt to double expose any negative which seems to be underexposed after you have made an inspection

Processing the negative

To develop the calotype you use the silver gallonitrate preparations that made up the exciter liquid in the second coating stage For development the two parts are kept separate and applied with individual buckle brushes. This can be carried out in safelighting. Remove the calotype from the camera or darkslide and wipe the emulsion with the silver nitrate solution, covering the image area evenly and once only. Then, do the same with the gallic acid solution and leave the negative for a minute or two. Using clean cotton wool, repeat the applications and leave the print for a further minute. Then coat the wet emulsion with the gallic acid solution only, continuing the application until a strong image is produced. This should have clear bold lines and well defined clear highlights and good vigorous contrast Judge the progress by safelight—do not take the negative into daylight yet

When development seems complete give the paper negative a four minute wash. Afterwards, fix it in a plain non-hardening sodium thiosulphate fixer bath. This needs to be about half strength because the image is not stable in the presence of concentrated hypo You can make your own fixer by dissolving 120 g plain hypocrystals in one litre of water. Divide this into two baths and give the calotype four minutes in each, agitating frequently.

A long wash should follow—45 minutes is recommended. For good long-term keeping qualities you can use hypo clearing agent

Calotypes must be dried gradually, at room temperature Do not use a hot drying cabinet. Retouching, which is often necessary where chemical impurities may have left pinholes, is now carried out on the negative [illegible] sky if this has low density Any [illegible] prietary opaque medium can be used

10 *Dry the paper ready for printing. To improve translucency, melt a little beeswax and spread this into the back of the calotype negative*

14 *After fixing, the purple coloured image of the exposed salt print (left) turns to a warm yellow colour (right) Give a long wash before drying*

Making prints

The next stage is to make a positive print from your calotype negative. Although you can use calotype paper for this stage, results tend to be rather contrasty and less pleasing than those made on easily prepared salt paper. Calotype negatives may also be printed on to ordinary fibre-based or RC papers

You can use the same paper as used for the calotypes for your salt prints Cut sheets to printing size and prepare the paper by soaking it in a salt solution consisting of 4 g table salt dissolved in one litre of water. Soak your paper for six minutes and hang it up to dry

Then, in safelighting, prepare the light sensitive emulsion by dissolving 10 g silver nitrate in 80 ml distilled water Stir well until it has thoroughly mixed in Then slowly—drop by drop—add 8 ml of 0.880 strength ammonia and stir the mixture until the solution clears. Pour 10 ml distilled water into a separate measuring cylinder, and carefully add 3 drops of concentrated nitric acid, stirr-

Newhaven fisherman *Hill and Adamson's famous seashore portrait—one of 1500 calotypes taken by the duo*

Edward Weston

By looking at the world around him in a fresh way, Edward Weston produced, over the course of 50 years, some of photography's classic and most memorable images

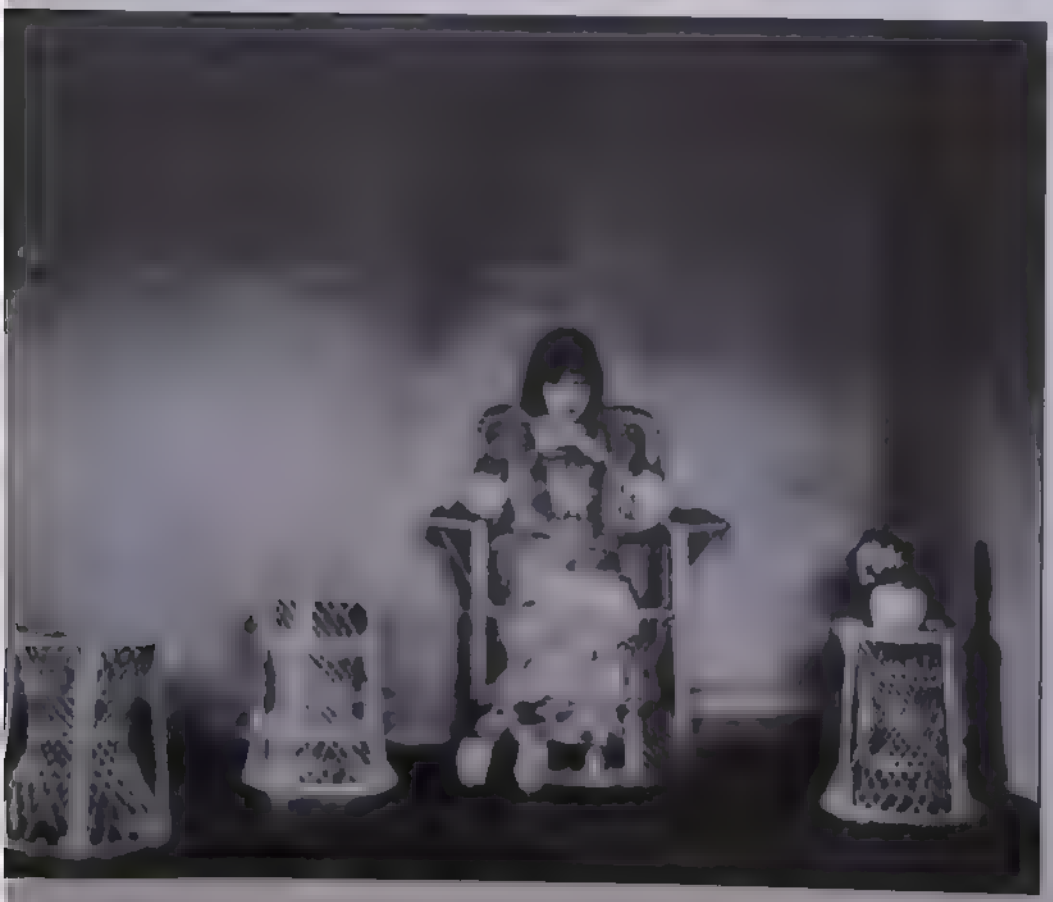
Edward Weston [illegible] pictures [illegible] and [illegible] nudes have been a source of inspiration to many. With his fresh and straightforward way of seeing and thinking he helped to free photography from its previously slavish imitation of art.

The beginnings of this great career were simple enough. In 1902 he was given a Kodak Bullseye 2 camera by his father—a common enough gift at the time, but one that shaped Weston's life from then on. Soon after he started playing 'hookey' from school to photograph the streets of [illegible] Chicago. He was also armed by then with another camera, a [illegible] and a tripod he had bought with carefully saved pocket money. Edward Weston had found his vocation, which he proceeded to pursue with passionate singleminedness.

An early move [illegible] West to join his sister May and her husband in Tropico, then a small but growing suburb of Los Angeles. His photographic career started with a postcard camera taking pictures door-to-door of householders, their pets and

Edward Weston *A soft yet very compelling and intriguing portrait taken by his son Brett in 1936*

Tina Modotti *This shot, taken in 1922 and exquisitely composed, reveals Weston's mastery of the pictorialist style —a style which he was to reject only one year later*



[illegible] Chandler with [illegible] By [illegible] he had [illegible] commercial portraiture which [illegible] importantly [illegible] his experiments in creative photography.

His style at that time was [illegible] influenced by the strongly romantic style of the Photo-Secession (see page [illegible] 1904 to 1915). Indeed Weston achieved considerable international success with his pictures in both group and one-man exhibitions. He even dressed the part of the artistic photographer he was to admit readily, in sporting a cape, cane and velvet jacket.

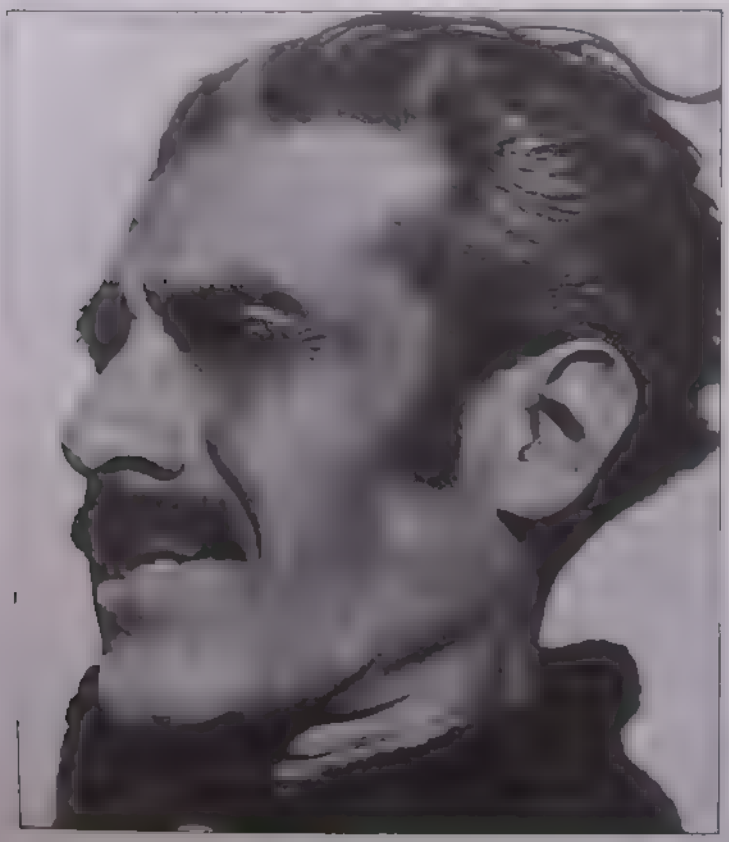
By 1915 he was beginning to reject these artistic conventions, gradually feeling his way towards a much more direct and graphic style, particularly in his non-commercial portraiture. His rejection of the artistic took a quite definite form. His youngest son recalls helping his father about this time to scrape the emulsion off prize-winning negatives so that the glass plates could be used to repair studio windows that had been smashed by him and his brothers. Weston never had qualms about destroying earlier work if he no longer liked it.

A further move towards establishing his own particular way of seeing came in 1922 when he travelled across the country to visit his sister May, then living in Ohio. Here he took his famous pictures of the Armco steelworks. Clarity of form and a feeling for volume and shape replaced the moody and one-dimensional approach of his earlier work. He refined this formula for the rest of his life in his search for a truth which he declared essential for the creation of photographic beauty.

Travelling on to New York he met Steiglitz, the self appointed guru of the Photo-Secession movement. He was encouraging, but, as Weston realized, had nothing to offer him. He was now his own master and confirmed in his determination to go his own way.

And on he went—this time to Mexico. Now he was to play hookey from his marriage, already damaged beyond repair, and, more painfully, from his sons. In 1923 he left for Mexico City with his eldest son Chandler and his pupil and mistress, Tina Modotti — an Italian born minor star of the silent screen, who later distinguished herself as a photographer and revolutionary.

Tina had visited Mexico City the



Armco *Weston's series on the great steelworks so excited him that he wrote in his diary, 'That day I made great photographs'. He moved in close so that the works dominated the frame. He then recorded them with a clarity which signalled his break with contemporary art photography He also rejected the Pictorialist fondness for manipulating prints*

General Galvan *A good friend of Tina and Edward's in Mexico. Weston took this with his Graflex just as Galvan was about to take aim with his gun for a practice shot*

Green pepper [illegible]

Nude 3 [illegible]

Wrecked car [illegible]

Driftwood stump [illegible] photograph [illegible] illustrates Weston's concern to reveal the underlying geometric structures of the natural landscape.

Civilian Defence *One of a series of bizarre and almost surreal pictures, here of his wife, Weston took during the war years in and around the house on Wildcat Hill*

What went wrong?

Shadows

[illegible]

The exposure is incorrect here—it is slightly overexposed, giving the washed out effect. The photographer might have warmed up the picture with [illegible] the eye is drawn by the shadow very [illegible] from the bottom right-hand corner of the photograph along the shadow of the tree trunk to a [illegible] the red brick wall. Everything above the [illegible] and [illegible] the [illegible] [illegible] The photographer should have framed them out. A [illegible] change of camera angle to include all [illegible] door would have helped create a [illegible] It is possible that the door was in the viewfinder when the picture was taken and that some of it has been lost behind the card mount. One must always remember when shooting a tight composition that mounts make the picture size smaller.

Evening sunlight, an old coach lamp, strong shadows, a whitewashed wall, three window frames and a door. All the elements of what could be an interesting and classic photograph. I'm afraid in this case it simply does not work. There is nothing in the photograph that holds together. The photographer has managed to jumble all the elements: the huge dominating shadow of the coach lamp, slap in the middle of the [illegible] looks plain ugly. There seems to have been [illegible] about the [illegible] strong and simple design are important.

It would have been better to concentrate on the shadow and the coach lamp, and to isolate them from the bits of the windows and other irrelevant shadows. Perhaps it would have been better to shoot this picture from the left side and have the coach lamp in the background with sunlight bursting through. In [illegible] you must be prepared to move about a bit, and to try different angles.

The main and most obvious problem with this picture is that there is no central point of interest. One looks at it and is puzzled. What is it? What is the photographer trying to say? I suspect that a 35 mm lens was on the camera and only one frame was taken from about 3 m. Subsequently, in my opinion, far too much texture to the elf has been included, and the off and the not in focus branches should have been cropped out altogether. They only confuse the picture.

The shadow falls across the picture by accident rather than design and the end result is a surprise and it looks like it. The picture should have been created rather than snapped. Decide what interests you and then concentrate on it.

In this case I would have used a longer lens—say 85 mm—and moved slightly to the right, concentrating on the patterned wall, bringing in a little of the wood texture and the shadow to help the overall content and design. The end result would, I think, have been much more worthwhile.

The photograph was taken at Saffron Walden, Essex, England, on Kodachrome 64 film.

Creative approach

Flowers

To the naked eye a flower is a thing of great beauty, but without creative treatment, photographs may fail to convey their full natural attributes

Extreme close-up *The photographer took care to make sure the [illegible] sharp but deliberately defocused the petals to create this [illegible]rful study.*
Worm's eye view *A group of flower may look appealing but will not necessarily make a creative picture. Here a low viewpoint and backlighting produced more impact*

[illegible] petal [illegible] nt of bl[illegible] tall and th[illegible] combination [illegible] these qualit[illegible] straight [illegible] as it m[illegible] at hrs [illegible] of the m[illegible] [illegible]ets in the garden is that of mov[illegible]ment. On all but the stillest day movement can be detected when photographing a blossom at close range and the magnifying effect of close up equipment aggravates the problem

Colin Molyneux

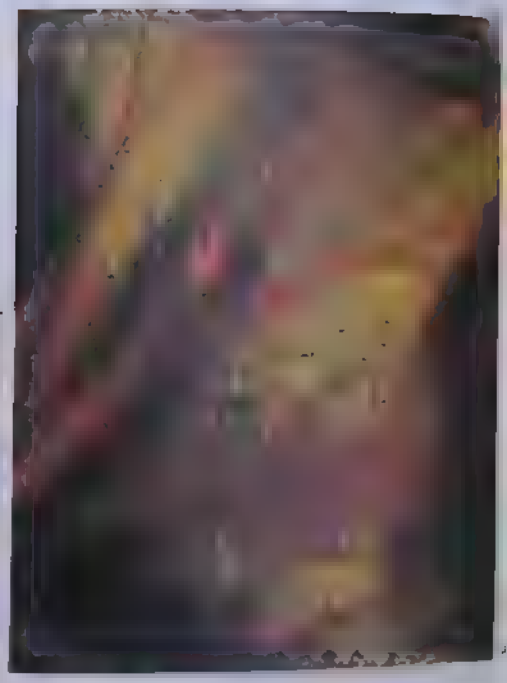
Clemans [illegible]

Dried flower [illegible]

Controlled lighting [illegible] conditions of a studio can be ideal for flower studies. Here a dark background contrasted with the flower

Close view The power of the studio flash allowed a small aperture to be used, giving the depth of field needed to bring out the texture and soft colour

Elizabeth Welsh



The image can then be [illegible] similar tied with the subject by the frame. The resultant blend of [illegible] with the colour shift can produce very striking results. A similar effect is achieved by using texture screens

Photographing flowers indoors does not necessarily involve using artificial light Window lighting can be used very effectively, as seen in the work of New York photographer Alan Porter, who photographed a whole series of images using dried flowers placed on sheets of rusty metal and other textured surfaces Dead flowers can be exploited in this and other ways—you can experiment with a more conceptual approach to produce unusual images [illegible] flowers laid on contrasting surfaces such as old wallpaper, or upon another surface—perhaps an old book

Adopting this approach is a far cry from the point of view of a naturalist or a gardener who is more interested in perfect examples of the species photographed in peak condition It means that there is just as much chance of finding creative potential in a dying flower lying forlornly in a leafy garden bed, than in a nursery field where large numbers of perfect tulips revive the landscape with their vibrant colour

Rose *This close-up concentrates on the texture of the petals rather than trying to show the entire flower.* **Grainy effect** *Most people try for extreme detail and sharpness when photographing flowers, but this shows how it can be effective to try the complete opposite. Here the photographer duplicated the original transparency sandwiched between a texture screen.* **Droplet** *A drop of water adds a feeling of freshness—even if it is deliberately sprayed on for the purpose.* **Garlic trimmings** *A 10 × 8 inch camera reveals the full textures of the dried garlic leaves and the background*

Photo silk screen process

Making silkscreen printed pictures from photographically derived stencils is an interesting way of applying your darkroom work

Portrait *The original for this vivid example of silkscreen printing was a selective enlargement from a rather mundane black and white negative*

The lith originals

mast
by pract
mater a ind

Making a silkscreen frame

Commercially made frames are available in wood or metal but are relatively ex- [illegible] With simple carpentry skills you [illegible] to use [illegible] size of prints you wish to produce and add at least an extra 78 mm all round to give adequate working clearances. This should be the minimum inside measurement of your frame.

To make a quality frame, pin and glue all corner joints—halving joints are quite adequate for small size frames. Make the base the same size as the outside measurement of your frame. You can now attach the screen to the base with screws and pack the hinges with strips of hardwood 8 mm thick. Glue two similar squares of hardwood to the front underside of your frame at each end. These spacers are used to 'lift-off' the screen from the base, allowing quick release of the mesh during printing. Remove the hinge pins to separate the screen from the base whenever you need to clean the screen, remesh the frame or transfer a stencil to the mesh. A useful extra feature is to screw loosely a supporting leg to one side of the frame. Every time you lift the screen when printing, the leg will drop vertically and so support the screen in a raised position. Although there is no need to paint or varnish the frame, it should at least be sandpapered smooth—particularly on the lower edge of the frame across which the mesh is stretched—otherwise the screen may tear

Mesh materials
Synthetic mesh materials have replaced natural meshes, making the name 'silk-screen' a misnomer. Nylon and polyester materials, specifically manufactured for screen printing are available from specialist suppliers. Less expensive substitutes are curtain materials which can be bought from drapery stores. For photographic stencils, select the finest plain weave

Stretching the mesh
Frames over one metre in length should be mechanically stretched by a screen printing supplier, but smaller home-made frames can be stretched by hand. With the help of an assistant you can stretch your own mesh. You will need a heavy duty staple gun and a light hammer. Cut your mesh so that it is 50 mm larger all round than the outside measurements of the frame. Stand the frame on one end. Fold the mesh under to form a hem, laying it [illegible] the frame [illegible] the material [illegible] staples at [illegible] along the [illegible] Turn the [illegible] other end, [illegible] a second [illegible] staples in [illegible] opposite [illegible] while pulling the mesh [illegible] the other two sides [illegible] now be [illegible] frame [illegible]

As a [illegible] tap the [illegible] finger—[illegible] and sound [illegible] strength cut strips of [illegible] fit along the frame edges and [illegible] down to trap the mesh between the [illegible]

Mesh preparation
All newly stretched meshes have a smooth, shiny surface which will [illegible] the stencil until treated. To 'key' a mesh, you must roughen it by first sprinkling with water and scouring powder, then scrubbing it with a nylon brush. Follow this with a force wash to remove all excess particles. This is a once-and-for-all process which need not be repeated during the life of the mesh. A mesh which has been previously used for printing becomes greasy with ink, or fingerprints and this could reject the stencil. It can be degreased with a two per cent solution of caustic soda, scrubbing with a nylon brush. Then wash the mesh with cold water.

can be 10 20 30 40 50 60 seconds at f/11 Move the card across the film at ten second intervals uncovering the film [illegible] imately 40 mm for each step [illegible] test strip in equal parts of A and B lith developer for 2½ minutes at 20°C Fix and wash then select three strips one underexposed one overexposed and a mid-exposed strip Make the final size lith negatives by exposing each one separately at the chosen time

To make the lith positives, start with your overexposed negative since this has the greatest area of black density Produce a positive test strip using a masking card this time in a large contact frame, or under glass (see page 916)

After processing this strip select a step having good black density area—the clear open areas should have no density Using the same exposure time as your selected test step, process each sheet of film equally and produce three finished size positives You can make the photostencil from either these three positives or the straight lith negative

Photo stencil material
There are three types of commercially [illegible] graphic stencils direct [illegible] and indirect film [illegible]

Indirect film is so-called because it is processed first and then transferred to the mesh later It is available from specialist graphic art supplies and can be handled in subdued room lighting The film is manufactured as two layers—one is a blue sensitive emulsion and the other a clear plastic carrying sheet Normally, the emulsion layer is soluble in water but when exposed to strong blue light is becomes insoluble During exposure to a strong blue light source the emulsion is rendered increasingly insoluble in water When a film positive is placed in contact with the stencil film, the image areas are protected from the light and so remain very soluble So when the film is washed out the image areas are dissolved away while the exposed areas remain intact leaving behind a stencil of the image

Making the photostencil
To expose the photostencil material you need a sheet of plate glass with smoothed edges, larger than your stencil, and a sheet of clean foam rubber mat to ensure good contact between your lith original and the stencil For the exposing light, a 150 watt photoflood is suitable—but you could use a movie light if you have one for shorter exposures

Position the exposing [illegible] above a suitable work top Lay the foam

Equipment requirements *You can make your own silkscreen frame or buy one ready-made from art supply stores. In addition to the screen, you need paper for printing, stencil film, a squeegee, mixing palette, inks, gumstrip, turps, and masking tape. A Q1 movie light or high intensity UV lamp is needed for exposing the stencil. Also needed are a foam rubber mat, a hairdryer or electric fan, and lay marks for registration. Old pieces of card, rag and newspaper should be used for cleaning the silk screen mesh after use*

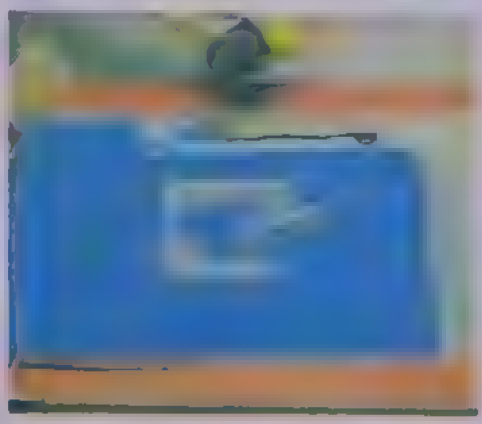
Making a stencil

1 *Start by making a lith film positive negative or set of separations from the original. A selective enlargement from a b & w negative was used here*

2 *Sandwich the lith image with a piece of photostencil film emulsion to emulsion and weighed down by a sheet of glass. Use a Q1 lamp for exposure*

3 *[illegible] the emulsion [illegible] completely [illegible] water temperature [illegible]*

7 ***Carefully peel off the backing layer of the stencil to leave behind the stencil emulsion and image on the screen mesh itself***



8 ***Carefully** apply special filler a blue **coloured** water soluble gum to clear areas of the screen surrounding the **picture image***

9 *Seal the inside edges where the mesh meets the frame with gumstrip. Add further filler as necessary and [illegible] **any pinholes left as the gum** dries*

Flag *The original image for this pair of silkscreen prints was a colour slide, from which a set of separations was produced. By printing part of this set a graphic effect is obtained (left). An alternative is to print on any suitable colour paper (inset)*

[illegible]

surplus water
with a warm air

4 *When all the coloured emulsion of the image has been removed, place the stencil on a foam rubber mat and gradually lower the screen into contact*

5 *Cut some sheets of blotting paper or other absorbent paper and lay this over the screen to dry moisture from the stencil, applying pressure*

6 *Use a fan—a hairdryer is particularly convenient—to dry the screen and 'fix' the stencil emulsion to the screen mesh. Complete drying before proceeding*

10 *Some form of print registration system is useful. One method is to tape the original lith positive to white paper and use this to position 'laymarks'*

11 *Carefully lower the screen and manipulate the lith image in register with the screen image using card handles fixed to the lith pos backing*

12 *When the image is in register, raise the screen and position self-adhesive lay marks at the corners of the paper. Make these from hardwood strip*

Preparation for printing

[illegible]

[illegible] beta[illegible]

with water soluble glue or spirit shellac [illegible]

Printing materials

You can make screen prints on virtually any paper which is smooth and not too absorbent, using whatever colour or [illegible]

based inks can be purchased from [illegible]

Paints can be used instead provided both the paint and stencil are removed from the mesh with suitable solvent immediately after printing

[illegible]

[illegible] lours [illegible]

ight then thin t[illegible]

Single screen prints

[illegible]

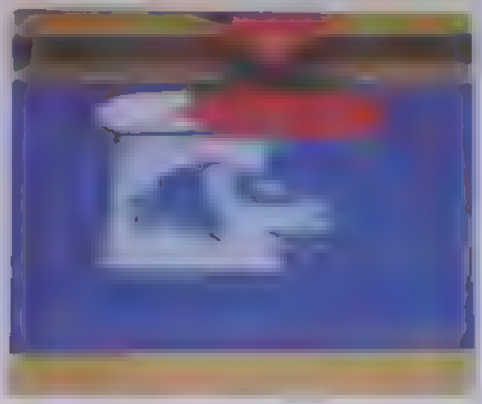
of paper under the silk screen—there is [illegible]

a small quantity of ink along the edge at one end of the screen clear of the actual image Hold the squeegee firm[illegible] pr[illegible] n hard at a 45° angle then draw [illegible] you to bring the ink across the image area in one continuous motion Raise the screen—avoiding ink drops and stroke the ink back through the screen Remove and check the first print Clip it into a peg and hang up to dry

Abstract *If you are printing from stencils made from colour separations interesting colour distortions can be made by using the 'wrong' colour inks*

Printing with the silkscreen

1 Start by preparing the ink or paint medium to be used for printing. Use turps to thin down thick paint, adding it gradually



2 A blend of colours can be made in several ways—here by placing a small amount of each colour side by side at the edge of the silkscreen

3 Draw the [illegible] and stroke the ink [illegible] screen. Protect the back with paper

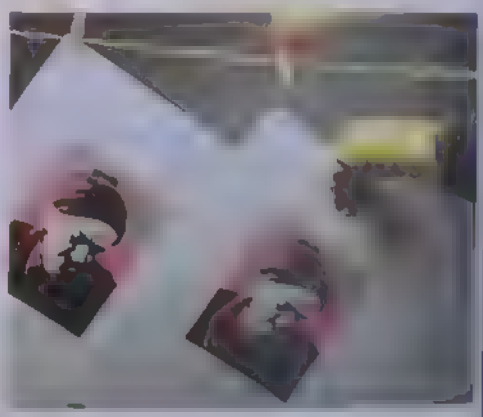
4 Having 'run up' the screen, you are ready to make prints. Put a sheet of paper in the laymarks and lower the screen on to these laymarks

5 Hold the flat blade squeegee at 45 and draw the ink towards you, forcing the screen into contact with the paper. Lift the screen and stroke the ink back

6 Remove and check your first print. If this is successful you can print a whole batch. Let these prints dry before adding another colour

7 Scrape off excess ink using a piece of stiff card. Place newspaper beneath the screen and wash the screen clear of ink using turps and rag swabs

8 To print subsequent colours, align the part printed image with the next screen image to position the laymarks. Then continue printing as before



9 For this image, a stencil made from a negative was used for the pink and white printing. This was overprinted using a stencil made from the lith pos

Tim Stephens

Commercial inks dry in 30 minutes—some even in a few minutes—whereas household paints may take hours.

If your prints stick to the screen, thin the ink further. Screen inks dry by evaporation and ink thickening can occur on the screen during a long printing run. If sticking persists, try increasing the physical separation, or lift-off, between the frame and paper provided by hardwood *laymarks* or separators (see panel).

You can prevent prints sticking at the corners by spraying the print base with low tack spray mount adhesive—this keeps your sheets flat.

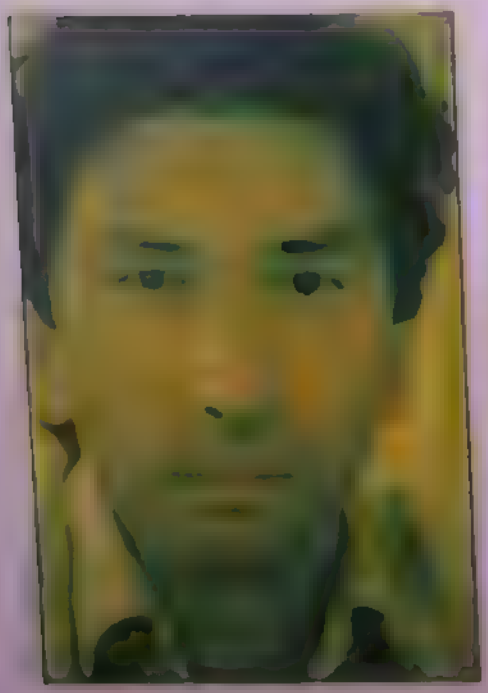
Providing the screen does not get clogged up during a run, you can run off as many prints as you like in one session—one of the significant advantages of this process. Simply repeat the [illegible] ink at the screen edge as it gets used up. At the end of the print run, scrape off any

Xmas card *A 35 mm colour slide was used to make a posterization in three colours. The scene is mainly 'cold', and so blue colours were printed to give the right 'feel' to this greetings card* **Windows** *Lith tone separations formed the basis of this abstract*

Multicolour registration

Chris Steele-Perkins

A keen eye and a strong sense of social awareness have combined to make Chris Steele-Perkins one of Britain's leading photojournalists



Shop window *The up market shops of [illegible] are a bizarre contrast to the conditions of city life*

El Salvador, 1981 *A woman searches for missing relatives among the victims of right-wing death squads*

Bangladesh, 1973 *The wan, curious faces of these peasants have been caught in a surrea, half light*

Chris Steele-Perkins/Magnum

The Teds, 1978 *Taken for a long-term project on a group which maintains the dress and style of 1950s teddy boys*

[illegible] the foreign [illegible] he [illegible]

Foreign trips are [illegible] Perkins' life In late 198[illegible] spent three months [illegible] photographing various aspects of life in South Africa On assignments like these he likes plenty of time to explore the subject in depth and it is quite usual for him to go back again and again until he feels he has the thorough range of coverage he wants

His expeditions are always planned in great detail and carefully researched in advance 'Contacts are tremendously important You talk to people who have been to the country you're visiting and try and get addresses, names of people to see places to stay If you are trying to do a story that is political and under [illegible]

[illegible] journalist calls for [illegible] your e[illegible] ber of phot[illegible] Mi[illegible] serious professi[illegible] running around in [illegible] camera So to get pict[illegible] that are a cut above the rest some risks may be necessary'

Not that Steele-Perkins is averse to taking considered risks He wanted to include material on the guerillas as well as the more often-seen coverage of the army and tried unsuccessfully to make contact four times 'Finally we just walked out of town in the direction we knew they were We got a little way out and met some young guys with guns just standing by the side of the road They [illegible]

Although [illegible] has been in[illegible] photograp[illegible] career In the mid 70s a [illegible] called *Viva* came over to [illegible] looking for photographers In the end both Homer Sykes and myself became

Ulster family, 1979 *Overcrowding at the home of a Catholic family on the Turf Lodge Estate in West Belfast* **'Tongue-tied' Danny's wedding, 1978** *Danny was the Teas boxer and a familiar figure at their gatherings*

me does mean that I can follow stories I choose and still

Somali camel herders, 1980 *Shown on the long trek through the Ogaden to find fresh grazing for their herds*
Hopping's Fair, 1970 *Outside a small wrestling booth in a traditional fair held every year at Newcastle-on-Tyne*

Soldiers at ease *For these young men the army provides one of the few secure sources of income in El Salvador*
Refugee mother and child *Two Somali victims of war and drought in the disputed Ogaden region of Ethiopia*

applies He
supply of spare batteries and new
anywhere wit
drivers All th
single
travelling bag and th
bag he carries around wit

While Steele Perkins is happy to work on long term stories for magazine and newspaper sales he feels that a more permanent form of work is necessary to make a really clear photographic statement 'Story

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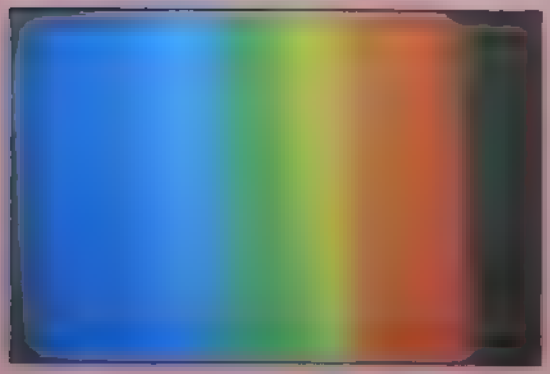
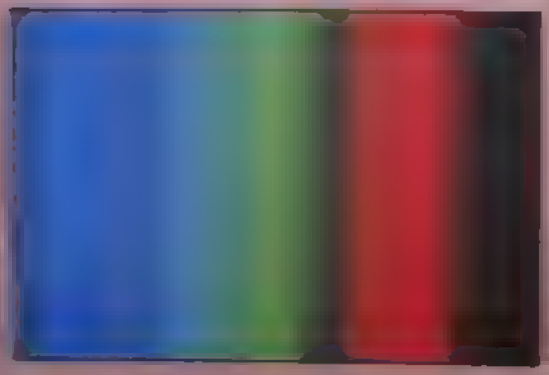
product Phot

journalist
He believe

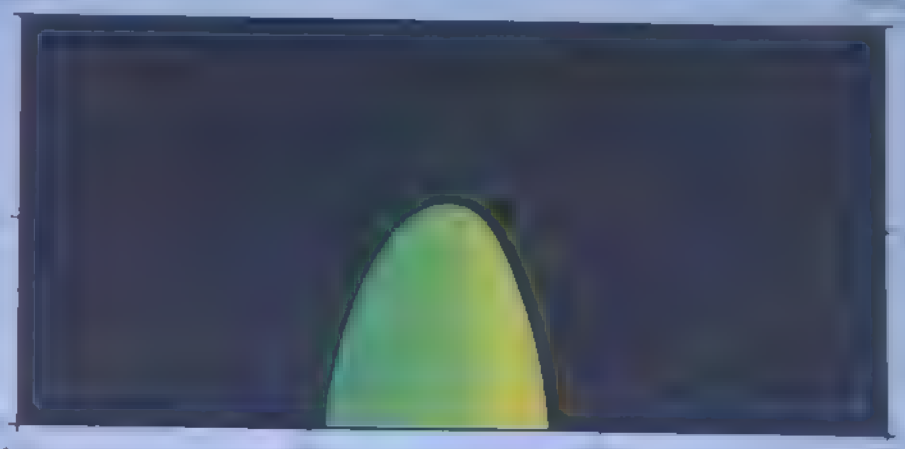
Understanding...

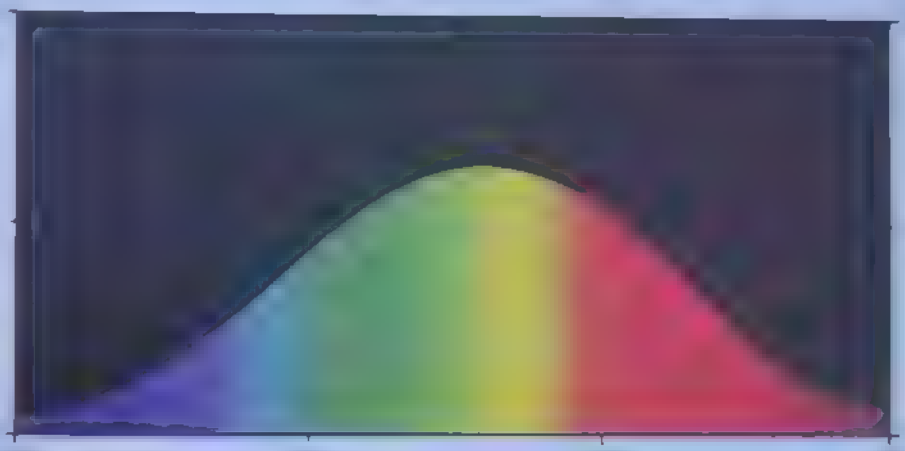
Colour filters





Absorption and transmission curves





Absorption curves

Curves *Typical absorption curves for a yellow-green correction filter (upper) and a 'narrow cut' green contrast filter (lower) for panchromatic b & w film*

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the wave-

gths for which absorption

relationship

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r example page 1970)

photospectrometer and plot-

ed on a graph as an

absorption curve The curve

clearly shows the dominant

to make a comparison It is

then easy to assess whether

the filter does the job

required

sa-eight for orth-ch-ma-tic

white printing paper

Filter curves also sh w

whether the filter is br ad

band or narr w cut A br ad

band filter transmits light

Assignment

Quayside café

Amid the bustling scenes in and around a quayside café restaurant can be found a sequence of shots which links the seafood catch to the diners' tables

Sorting the fish
To include the fish, the man and the fishing boats all in one shot Trevor fitted a 3 mm lens to his Olympus OM 2 [illegible] **The catch** *A 50 mm standard lens filled the frame with the silvery catch Trevor re-arranged the fish to form attractive graphic shapes* **Window display** *(above right) To [illegible] out all the details [illegible] used a 21 mm lens, at f 8 The slow film Ektachrome 64 meant that a tripod had to be used to support the camera at slower shutter speed The camera was set on its manual mode for all these shots*

The proprietors *For a portrait Trevor asked the owners of the cafe to stand outside with some food prepared for the day. Since he was using available light the camera had be mounted on a tripod—this meant asking the local police for permission since it is illegal to use a tripod on the pavement in France* **Customer** *This customer was sitting next to an open window, so Trevor took his shots from outside* **Coffee and cigarette** *These were arranged to create a pleasing design*

Jason Shenai/lights courtesy of Photax

Equipment file

Movie lights

Many home-made movies taken indoors are spoilt by inadequate lighting. But even simple movie lighting equipment can radically improve any amateur film

As with still photography, [illegible] is usually needed if you want to shoot movies indoors. The most common [illegible] of lighting for still pictures is flash, but this is completely unsuitable for movie work. Movie lights must stay very bright for a long period of time and this [illegible] be taken into account in their design and construction.

The professional movie maker has a wide range of lighting equipment from which to choose, but much of it is so expensive as to be beyond the budget of most amateurs. The constant transportation, assembly and dismantling of the equipment means that only the most robust construction will do, and this inevitably, proves expensive.

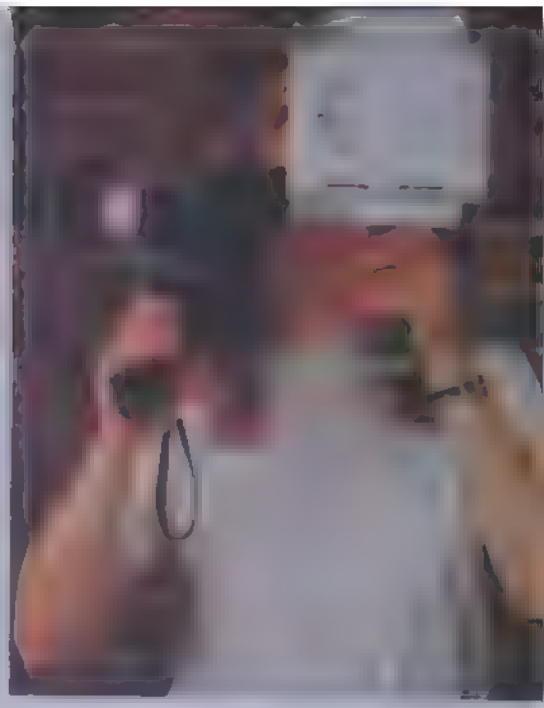
For the amateur budget, the choice of lighting equipment for movie making is increasing as the use of video becomes more widespread, since the same units apply to both. As with any form of photography, the more equipment you have, the wider will be your scope, but many good movies have been made with [illegible]

For indoor work, mains power is readily available, so bulb ratings [illegible] high to give high levels of illumination. And with the efficiency of quartz bulbs you can buy indoor lights for almost any filming conditions. Lights are available in a wide range of ratings but, usually they consist of a 1000 watt quartz bulb in a well ventilated housing with a reflector. They are lightweight, so they can be hand-held. A simple light with bulb costs little more than a couple of sound movie cartridges but this simple type is prone to overheating. In fact, they should not be left on for more than about three to five minutes at a time. Fortunately, this is not usually a problem for amateur work, because a Super 8 film is [illegible] In any event [illegible] would be [illegible] overheating [illegible] quartz lights [illegible] light [illegible] be left on [illegible] without [illegible] They [illegible] but the impr[illegible] worth having [illegible] bulbs [illegible] of the light output being doubled [illegible] about one half as much and [illegible] intensities are desirable, part[illegible] you wish to light a large inter[illegible] even a large amount of ligh[illegible] surprisingly small way in a big hall.

[illegible]n-bulb lights are not directional instead they flood an area with light and so are no use as spotlights, which need some sort of lens system. Nevertheless the area they light can be controlled to a limited extent by the use of *barn doors* (hinged metal flaps attached to the front

An amateur set-up *This type of lighting is designed for still photography but can be used for movie*

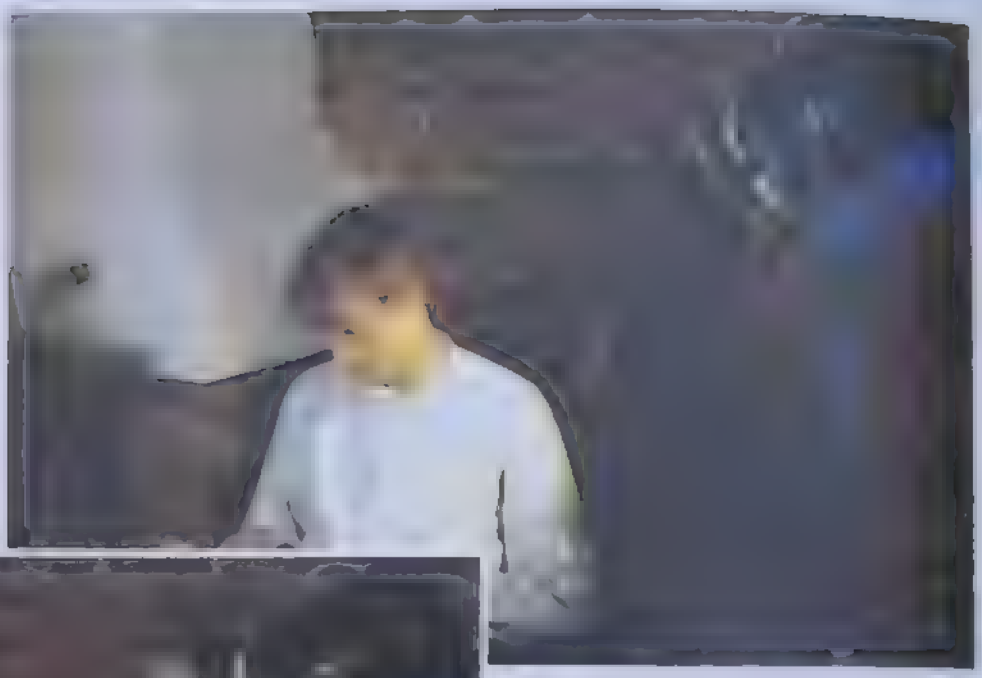
On camera *Portable be attach*



lights—whether they are spotlights or floodlights—be sure to stand [illegible] th and to one side to avoid the risk of mod

Accessories

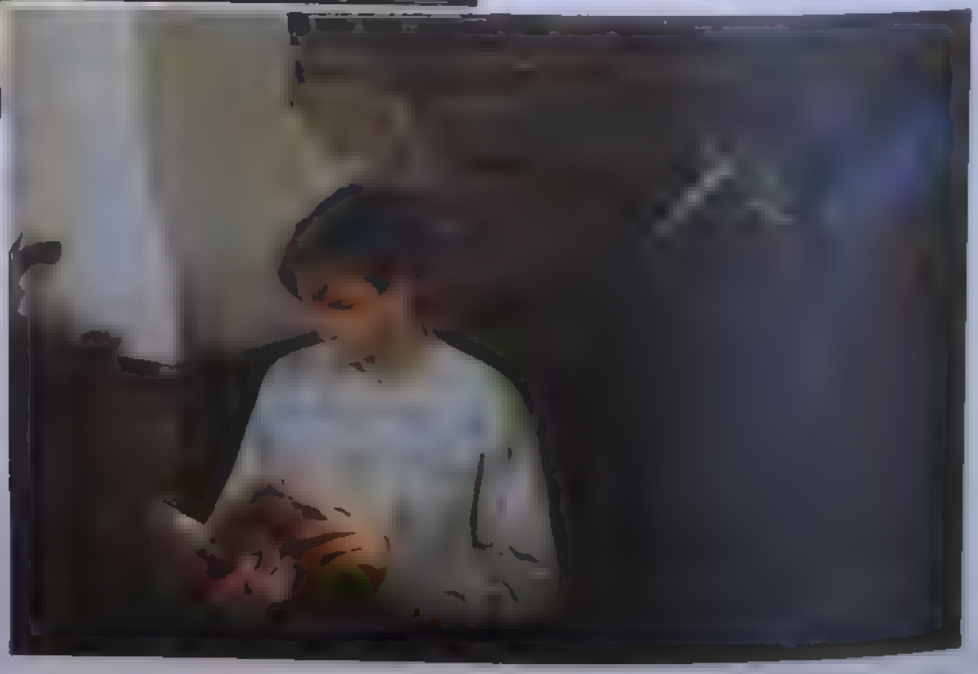
Quartz lights *The efficiency of quartz iodine lamps makes a high light output possible from small, hand-held units Fan-cooled models (right) are more expensive but they allow continuous use for extended periods*



Barn doors [illegible] allow the illuminated area to be changed. Some [illegible] have them, but you can make [illegible]

Narrow angle [illegible] doors inwards [illegible] narrower beam [illegible] surrounding [illegible]

On the spot [illegible] produce [illegible] used [illegible] the zoomed [illegible]



[illegible] the [illegible]

When you film in a mixture of daylight and tungsten light, and wish to balance [illegible] or the other. If you use tungsten light [illegible] with the window, for example, you can place orange filters over the window to match the daylight with the

Greater scope

Outdoor lighting

Unwanted reflections *can be avoided with a French flag, used to shield the camera lens*

ice for
t of an avera ge sound movie
in can be a n ca or movie
ecially if it is likely to be used only
occasionally. However, the look of your
movies could be considerably improved

Pictures from aircraft

Aerial shots often make unusual and exciting images, but to get good pictures from the air you need access to a light aircraft and the ability to think and work quickly in a difficult environment

Shoun Kelly Tony Stone Worldwide Library

Cloudscape *Even if the ground is not visible, you can often take pictures of impressive cloud formations*

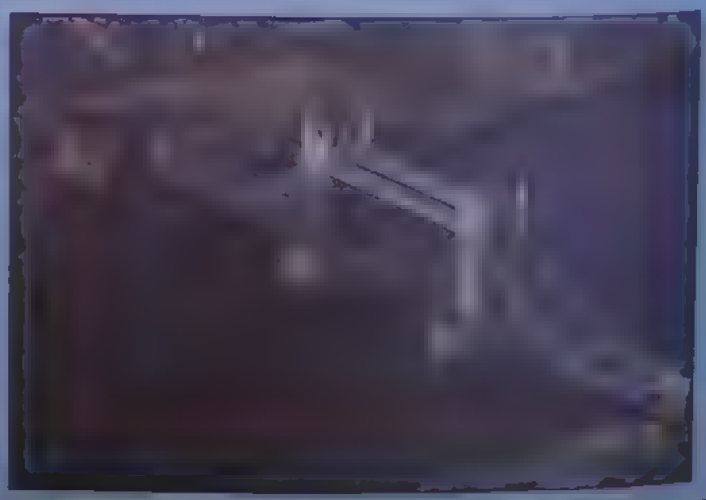
Most people travel in an aircraft at some time or other. And for the photographer flying presents an exciting opportunity for unusual landscape shots. Apart from its practical value as a tool for commercial surveys, such as archaeology, geology, map making and crop analysis, aerial photography is really dramatic panoramic views.

Taking pictures from planes, helicopters and gliders is relatively straightforward and no special equipment is needed. The results are affected more by the type of aircraft used, and so some of the most important considerations relate to the aircraft and the flying rather than the photography. So these should be thought about before you begin. The photographic techniques which are covered here apply to all types of suitable aircraft.

Aerial photography is a wide term. It includes pictures taken from flying machines ranging from airliners to gliders. Although it is sometimes possible to take interesting shots through the window of a jet, this approach is very limited. So this article is mainly concerned with shooting from light aircraft.

These are expensive to hire, but you

Which film? *We flew over London aboard Capital Radio's 'Flying Eye' traffic plane to find out. From left to right: Kodachrome 64 is sharp but was affected by haze; B & W infrared film is little better; but false colour IR film gave the clearest results, and produced some very graphic images*



Plane and pilot

The weather

Coping with haze

Past glory

Exposure and equipment

What were wrong?

Using frames

Many good pictures use a natural frame in their composition. Here Sykes comments on the use of the frames in these shots.

Assignment

Hardy's houses

Some buildings naturally lend themselves to producing attractive images, others don't John Sims demonstrates how an imaginative approach can make up for any shortcomings

Town house *The only way John could take a straight shot of the house was to use a 300 mm lens from the top of a nearby block*

Country cottage *For a broad view of the cottage John waited for the afternoon light and framed the shot to lead the eye to it*

Most people [illegible] graph the cottage [illegible] stand inside the [illegible] frame their shot [illegible] much of the house and [illegible] that their lenses [illegible] John deliberately av[illegible] this approach and [illegible] several different ways [illegible] creating a more unu[illegible] interpretation of the sc[illegible]

The London house w[illegible] more of a problem Since there were cars parked in front of the house and a railway line blocking his view, John found that there was no way of obtaining a satisfactory shot at close range However, by photographing from the top of a tall residential building nearby he managed to frame his shots to include the house, the railway line and the road, creating both an attractive picture as well as making a statement about the changes which have taken place since Hardy's day.

John Sims

Busy neighbourhood

Night time

DIY Lightboxes

Lightbox applications

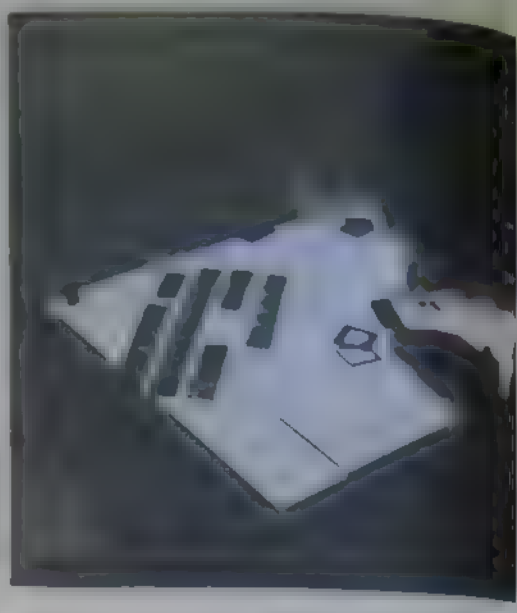
Tube types

Home-made lightbox A lightbox is one of the most useful pieces of equipment you can be ever making your own lightbox can save you a great deal of money. The design of this box is shown opposite

Controls and wiring

Replacement tubes

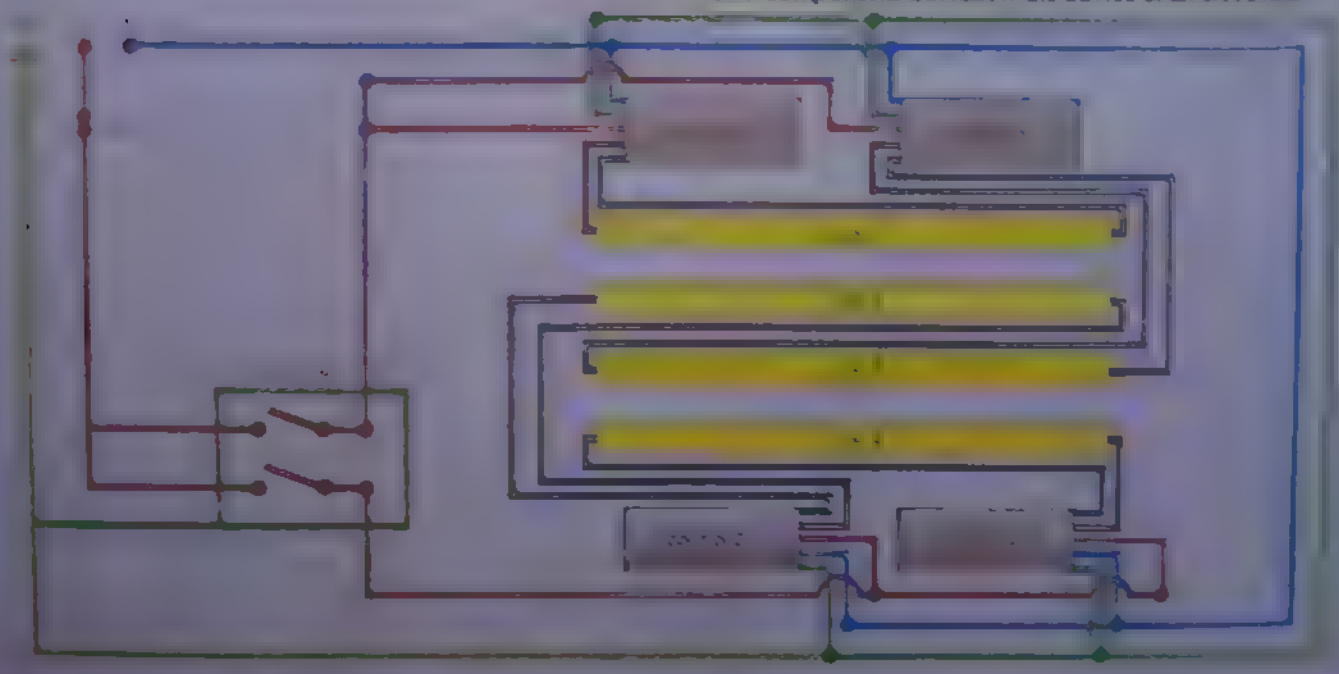
The diffuser panel



Ventilation

Lighting circuits

The layout of a standard starter switch circuit, with a PFC capacitor, is shown on the left. The ballast, or choke capacitor and starter switch can be obtained in a unit which requires only the addition of a tube, switch and plug to become operational. Ready-assembled units such as this are sold for gardening and aquarium use. Or you can wire up your own components but follow the advice of an electrician.



Retouching *A useful application of a lightbox is to provide good back lighting for retouching—a frequent and often necessary chore if you use bth film*
Cutting *If you use your lightbox for cutting film in strips, or to size, place a sheet of glass on top first to prevent scratches. Have the edges ground smooth. Use thick plate or float glass, of the strengthened type if possible.*
Tube type *You may choose to use shaped tubes (far right) in your design. Miniature tubes are available also*

Lightbox construction
Melamine faced chipb

nificantly

hting

Tube characteristics

Tube colour	Colour temperature	Colour appearance	Colour rendering	Efficacy (l/w)	Usual application
				67	general purpose to
Kolo					
Natural	4000K	neutral	good	52	general lighting
					general lighting
					general lighting at

painted of
d boil pr
s these are less
suffer n-at bond up
ightbox
nts used for interior finish sho d be
above all—capable of withstanding high temperatures Your local supplier should be able to help you choose some

FASHION

Fashion photography may seem simple but there are many techniques and techniques you can use to add sophistication to your shots

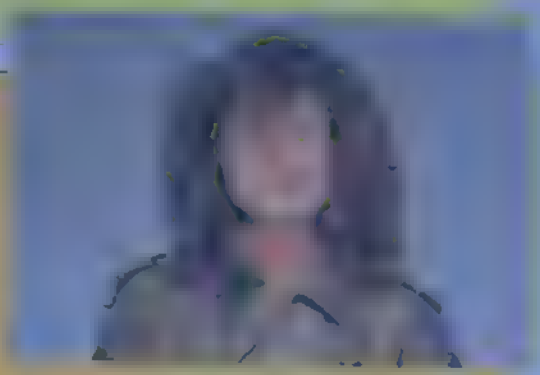
The main difference [illegible] other phot[illegible] is that in fashion phot[illegible] to show the cloth[illegible] effect rather than ju[illegible] attractive pictures. Many [illegible] techniques are therefor[illegible] directly with the clothing and mod[illegible] rather than the photography, though [illegible] tographic techniques such a[illegible] lighting, do also play th[illegible]

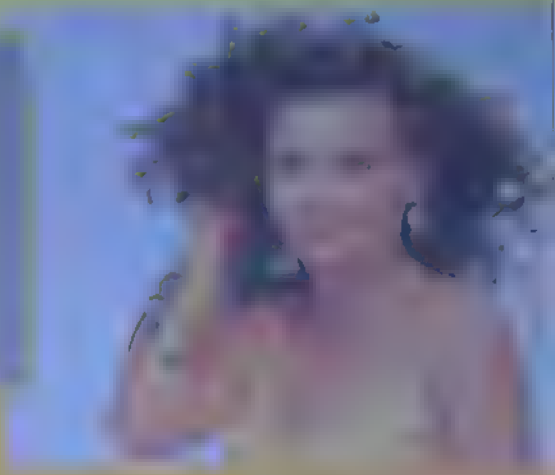
It is virtually impossible to take and produce sophisticated pictur[illegible] fatty dress on a disinterested mod[illegible] these are the aspects which have to b[illegible] considered long before shooti[illegible]

The clothes

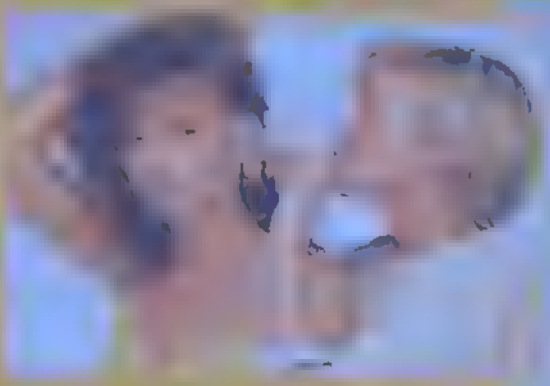
If you are photographing the cl[illegible] assignment [illegible] ch of a ch[illegible] e. But if as is mor[illegible] ooting for yourself th[illegible] de. It is best to choose t[illegible] in with a previously worked ou[illegible] rather than selecting at random. You should always have some idea of th[illegible] mood or appearance which you want t[illegible] create so that everything—includin[illegible] l, location, props and so on—can be ch[illegible]

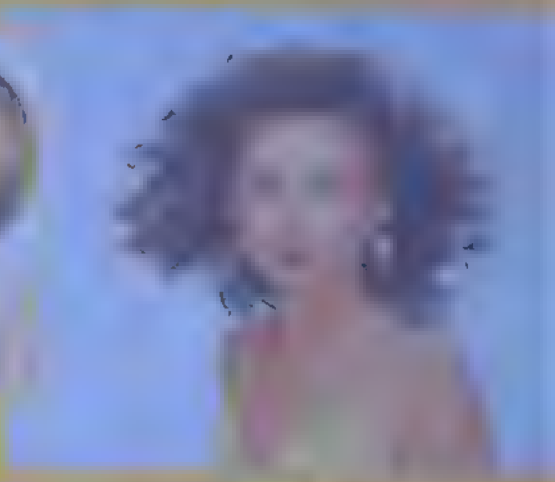
Bear in m[illegible] that some garm[illegible]





Before and after *Skilfully applied make-up can make a world of difference to the model's appearance*





Faking it *In this shot earrings were used to liven it up. The model's ears were not pierced so tape was used*

Livelier shot *By adopting a more striking pose the model helps to make the most of clothes and accessories*

Producing the shot *Quite complicated set-ups (below) are often used to produce apparently simple shots (left). Equipment used in this shot includes a wind machine and a heater, which was needed to keep the model warm in the breeze!*

accentuate the apparent horizontal bull[illegible] woollen pullovers, bulky satins, full [illegible] patterns (especially stripes) and light colours. Conversely, a slimming effect can be achieved through the use of dark colours, vertical patterns, and materials [illegible] crepe or chiffon [illegible] pressed or ironed before the session. It is a good idea to have an iron at the [illegible] by the model can be removed during the shoot. If the clothes are being taken to a location, pack them with tissue paper or put them on hangers with plastic covers [illegible] ver them [illegible] over the clothes especial[illegible] [illegible]n borrow[illegible] The neater [illegible] ments, the better your pictur[illegible] Never pull loose thr[illegible] let down a hem or wor[illegible] difficult to repair. It is [illegible] way. When your models change [illegible] getting make up on the clothes. M[illegible] cover their heads when changing to avoid this problem.

You frequently find that the clothes do not fit exactly. Even garments belonging

The model

the model's pose. For example, jeans can not fit properly if the seat looks a bit [illegible] the jeans are loose around the thighs get the model to raise one leg by placing a foot on a box or stool. This tightens the appearance of the jeans as well as [illegible] clothes but also the general mood of the picture. Belts, jewellery, shoes [illegible]

Model great [illegible]

The lighting

Adapt adept and improve

anything other [illegible]
record shots. It is [illegible]

[illegible] 2475 Recording [illegible]

using a wide angle lens and a [illegible]

Viewpoint

Whether shooting from the eye level of a bird or a worm or simply from your own normal standing position choice of viewpoint is a vital photographic element

Garden
level so the photographer used an adjacent building for this shot

[illegible]
[illegible]
was not an exer
simply a matter of shoot
squatting position rather than from
normal eye level

A low viewpoint can also be invaluable in a more pictorial way. It can allow you to give less emphasis to a featureless foreground, perhaps by using a wide angle [illegible]

tween some blades of grass. The

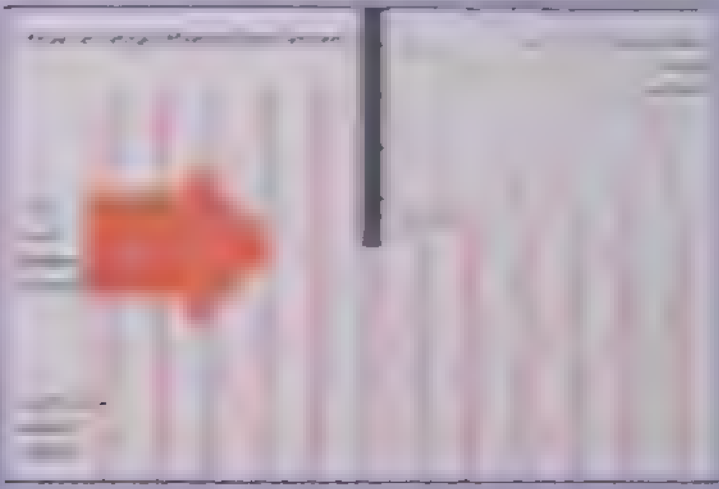
Low shot *By lying on the ground beneath the marksman, the photographer created a sense of menace* **Modern architecture** *The convergence caused by using a wide angle lens from a low viewpoint adds emphasis to an unusual design* **Rear view** *Here the choice of viewpont created a striking image of a familiar subject* **Tables and chairs** *A high viewpoint allowed the brightly painted objects to be contrasted with the surrounding foliage and resulted in this particularly striking image*

Cafe [illegible]

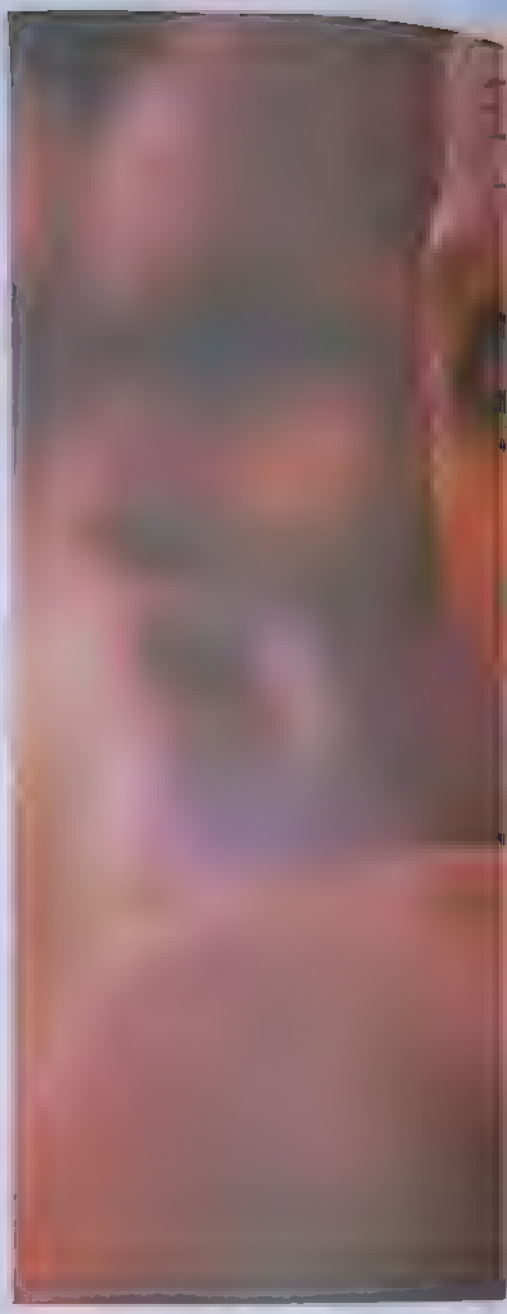
Cat [illegible]

Washing [illegible] **Feet** [illegible] **Camel** [illegible]

Diffraction



Brian Brake



Life producing pictures in the pictorialist style that was then fashionable with camera clubs and amateur photographic societies. But when Brake left school to make his way in the world he was immediately confronted with a different type of photographic challenge. He took a job as an assistant to Spencer Digby, a Wellington portrait photographer. For the first time in his life he was concentrating on taking pictures of people.

Looking back on those early years Brake regards his education in studio techniques as invaluable, even though an assistant's life is often tedious and repetitive. 'Digby wouldn't let you use a light meter in the studio,' Brake recalls. 'He'd say "You've got eyes—use them".'

In those days studio lighting meant large continuous source tungsten lamps that allowed minute control of lighting effects. Even now, despite the almost [illegible] use of electronic studio flash,

The most important lesson Brake learned in five years of portrait photography [illegible] to reveal character by the subtle use of light and camera angle. The prospect of spending the rest of his life taking pictures of parliamentarians and socialites lacked appeal, however, so in 1950 he joined the New Zealand National Film Unit. At the time the National Film Unit had a world-wide reputation for its innovative documentaries and promotional film, and the training that Brake received was first rate. He made rapid progress, and before long he was editing and directing his own films. The National Film Unit had excellent facilities and was well funded, but unfortunately it was also answerable to the government. Although he managed to turn out some fine work, Brake ultimately found the bureaucratic restrictions imposed from outside the unit too oppressive. He decided to pack his bags and head for London, hoping, like many other Commonwealth citizens in the drab 1950s to find success there.

Included in his travel kit was a Leica screw thread rangefinder camera.

It was the Leica that led Brake to his new career. He had expected to find work in the British film industry, but he found that the difficulties were more than he had bargained for. Without a union card, there was little he could do but wait for a lucky break. While he waited he filled in time by shooting candid portraits on the streets of London, more for his own satisfaction than for any other reason. The Leica, so different from the large plate and studio cameras he had learned his craft with, turned out to be ideal for street pictures. Gradually he assembled a portfolio comprised of these pictures and his earlier scenic pictures from the South Island.

Eventually his Leica needed servicing. Although short of money, Brake decided to have it overhauled at the Leitz factory in Wetzlar, Germany. He took his portfolio with him.

Up until then, my main mistake [illegible] been in showing my pictures to

Kyoto Japan [illegible]

Girl on a swing [illegible]

Chinese mobiles

Cheerleader Japan 1964

Maori carving

Fiery glow

Washers and dryers

Print washing and drying can be made considerably simpler if you use equipment designed to ease the chore of the processes. But what you buy depends on which type of print paper you most frequently use

Print washing and drying pro[illegible] among the dullest and m[illegible] consuming of darkroom chore[illegible] these tasks, which simply inv[illegible] holding prints under a run[illegible]ing ta[illegible] fanning them in the air, are of v[illegible] importance to the final quality of [illegible] images you produce. However, mu[illegible] the tedium and the time spent can be considerably reduced if you buy washing and drying equipment to do these jobs for you.

The range of products available for washing and drying prints is extensive and your choice of equipment will depend on how much printing you do, the facilities in your darkroom and the size of your budget. If you print only the odd frame or two at infrequent intervals then even the smallest outlay might seem an unnecessary expense. But if you frequently print 20 or 36 frames at a tim[illegible] washing and drying equipment will soo[illegible] pay for itself—but it must be cho[illegible] carefully if it is to be put to best use and be economical.

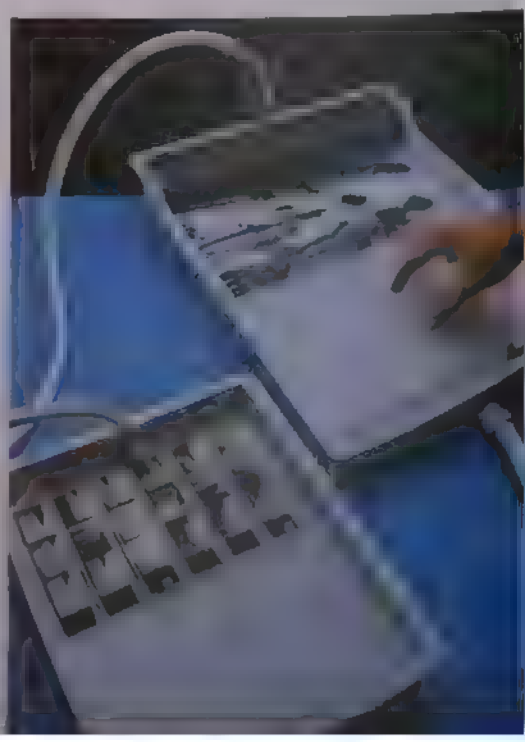
Few amateurs have a darkroom with running water, where a washer can be set up permanently. And unless you have a spacious bathroom or kitchen where you can do this, you will have to choose equipment that can be set up and dismantled easily and quickly. Space is less of a problem for print dryers. A corner in any room with a power point will suffice, but it should not be too far from the darkroom or you will probably end up spilling chemicals while moving between rooms.

One other factor that will affect your choice of equipment is the type of paper you usually use. Many photographic papers—both colour and black and white—are made with a resin coated base, which is covered on both sides by a thin layer of polythene to prevent it absorbing water and chemicals. Resin-coated papers can, therefore, be processed, washed and dried much quicker than traditional papers in which the paper base soaks up the solutions. But it [illegible] t sufficient just to leave resin-coated [illegible] with a minimum of [illegible] flow or stirring in [illegible] is essent[illegible]

Photographs by Dave King. Equipment [illegible] Photax Ltd

Overflow devices, *placed in the plug hole of a sink or bath, are the simplest and cheapest means of washing prints on any type of paper*

High speed washers, *intended for resin-coated papers, provide a rapid flow of water over both surfaces of the prints and are compact*



Equipment courtesy of Paterson

Overflows and syphons

For fibre-based paper, which requires little stirring, the simplest and least expensive print washing device consists of an overflow tube placed in the water outlet or plug hole of a sink or bath so that it protrudes upwards. It maintains a constant head of water into which the prints to be washed are immersed while the tap flows.

Such a device has a flow rate limited by the size of the outlet. It is also possible for a print or small test strip to wrap itself round the outlet, covering the holes and risking an overflow.

One variation on the overflow principle consists of a tube within a tube both being jointed at the lower ends. Water from the tap enters the inner tube and jets through holes at the base into the sink or bath. The jets of water cause [illegible]ce, which stirs the water and [illegible] the prints effectively.

Double sided paper

High speed washers

Slow washers

Drying the prints

An auto washer

Rotary paper

Drying fibre based papers

Heat assisted drivers

What went wrong?

Flower power

Photo-reportage

Reportage photography is not the exclusive province of professionals—many excellent images can be produced at small local events, and this is where the amateur can be at an advantage.

Fairbanks [illegible]

Air crash *Shots like this are mainly a matter of luck but it still takes skill to overcome your emotional response to produce a photograph that communicates the horror in a tragedy to others*

Riot patrol *Careful choice of viewpoint generated maximum impact from this tense scene. The side view leads the eye into the picture offering an involved glimpse of the determination of the patrol*

ool
ch
may be
there may
impromptu street theatre
Details and incid
make good photograph
might be carrying a sleeping
someone might take off their boot
their feet, or jump into a fountain
cool. All details like this give an
look at any event, and are refreshingly different from the usual news coverage.

When the event you are covering is also being photographed by the media, it is worth buying newspapers or magazines and comparing their results

eduled
village fair, a scout meeting or a pensioners' swimming club marathon all offer excellent opportunities for reportage. Their organizers will be only too keen to have photographic coverage and you will probably need no pre pass whatsoever.

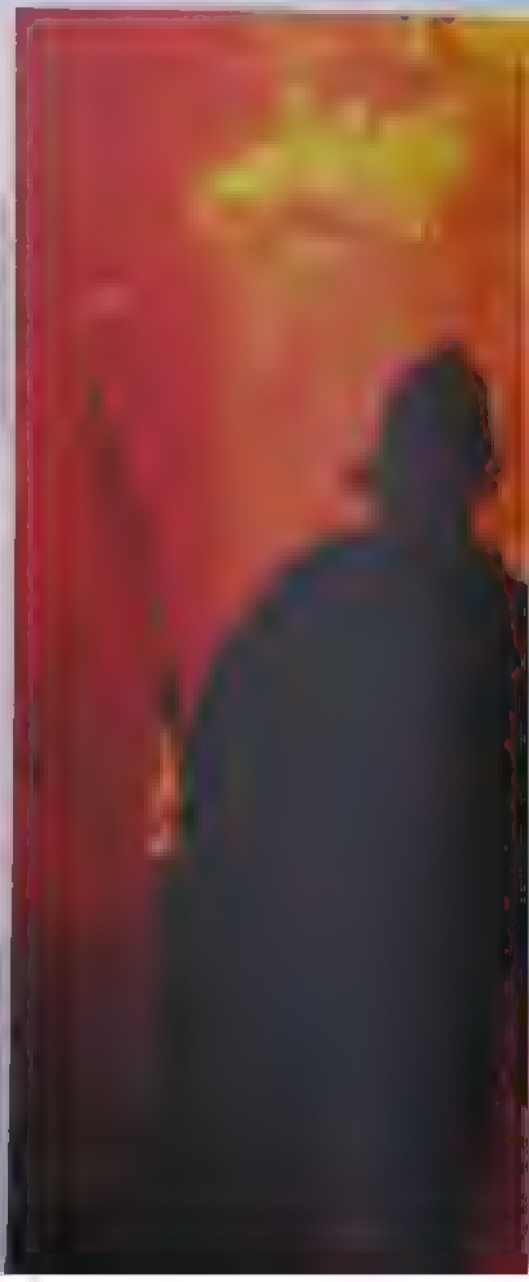
Head-on view *This shot includes all the main elements but the viewpoint fails to create impact or pinpoint a centre of interest mainly because the guards are not facing the camera*

Breaking up a demonstration *Even without time to observe rules of composition the photojournalist has to develop an instinct for concentrating on a main subject here the girl lady and relating it to the main event*

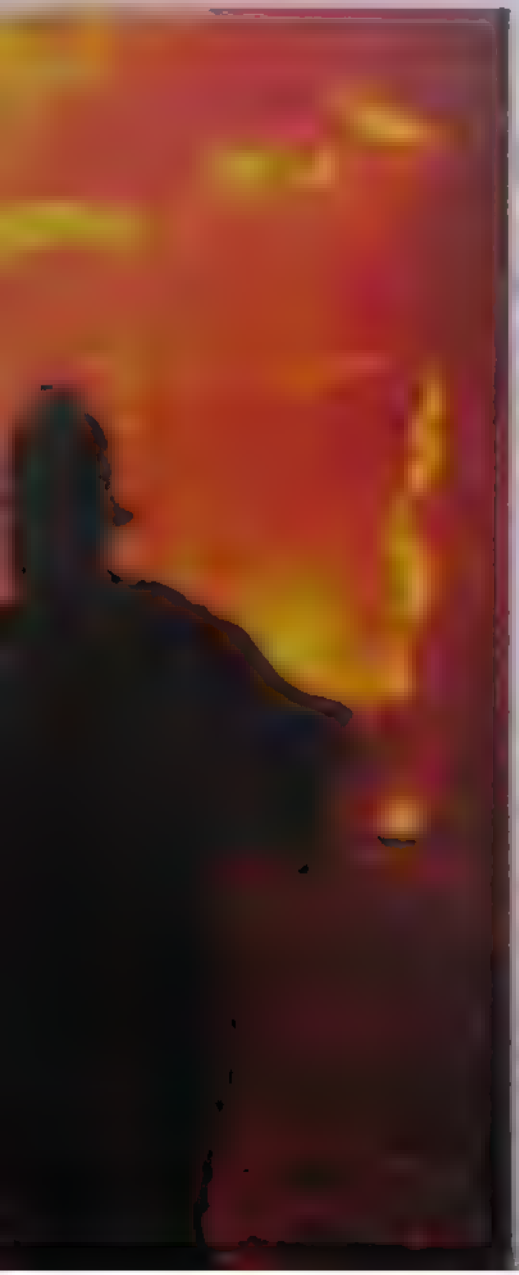
Tanker disaster

Crowd in protest Shots of [illegible]

Closer view [illegible]



Riot



Snow storm

El Salvador demonstration

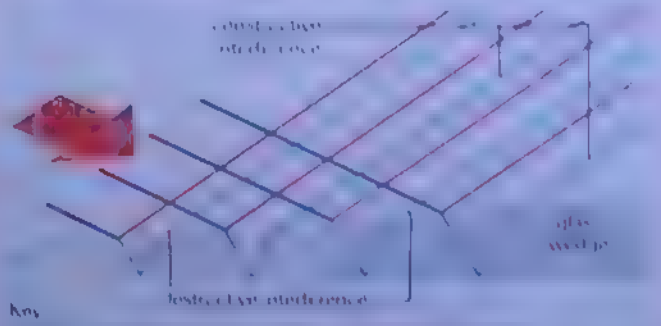
Understanding...

Interference

[illegible] waves from two directions meet [illegible] together with each other and this [illegible] has a number of significant photographic effects.

Newton's rings [illegible]

Interference in a glass wedge



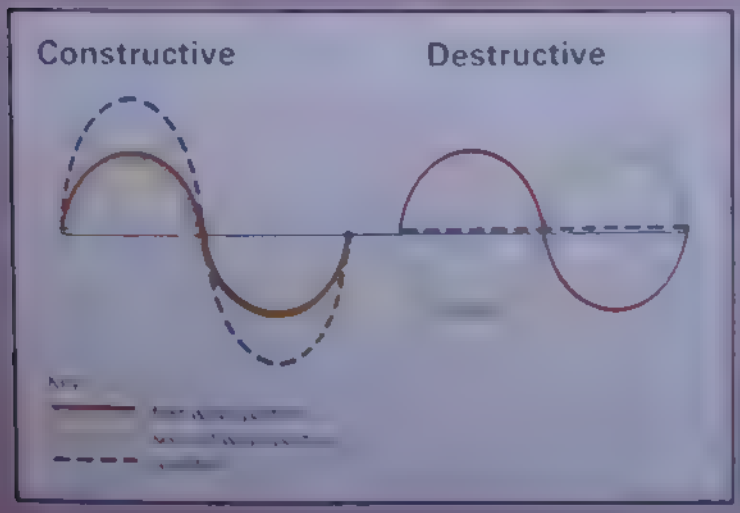
Interference fringes on a glass wedge occur because light reflected from the internal surface travels a little distance further than that from the top surface.

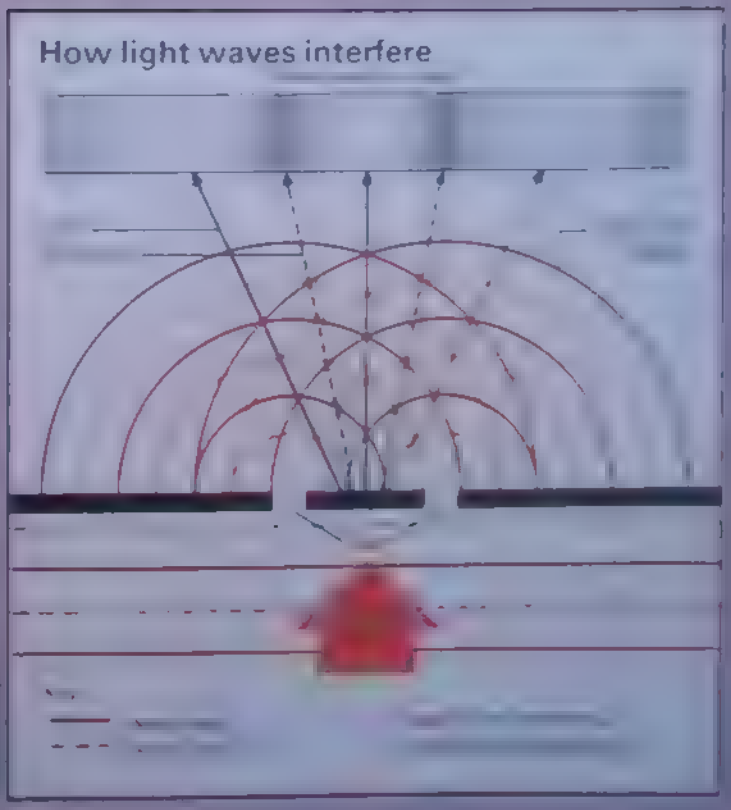
Bloom *Interfer*
ight reflected
externally is used in lens

Normally, these inter-
invisible to the naked eye in white light because white light is composed of many wavelengths of light and the interference patterns in one colour are cancelled out by

when the separation between the two reflecting surfaces is about one wavelength thick.

Interference *When wavetrains meet crest to crest, they combine constructively to make one big wave; crest to trough, they cancel each other out (below). This creates patterns of dark and light (interference fringes) when the waves diffracted beyond a pair of narrow slits meet and*



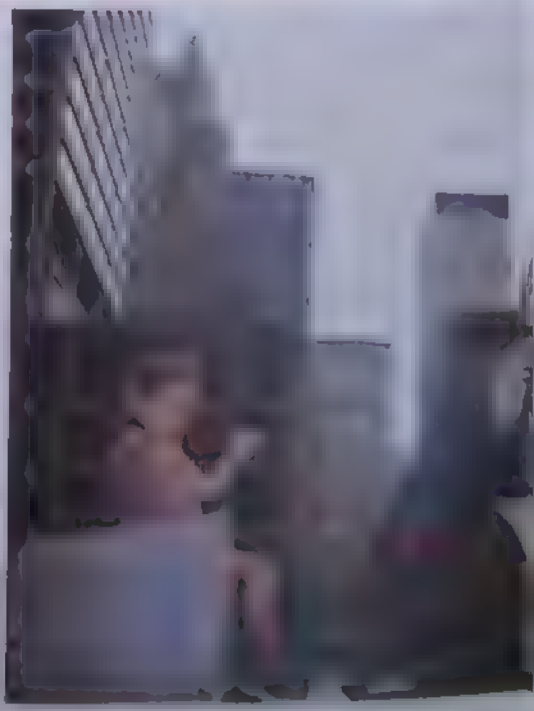


Improve your technique

Natural flash

Many amateurs use their flashguns only when it seems too dark for normal exposures. But you can use flash even in fairly bright conditions to lighten shadows, improve colour and increase sharpness.

Sharp crosses

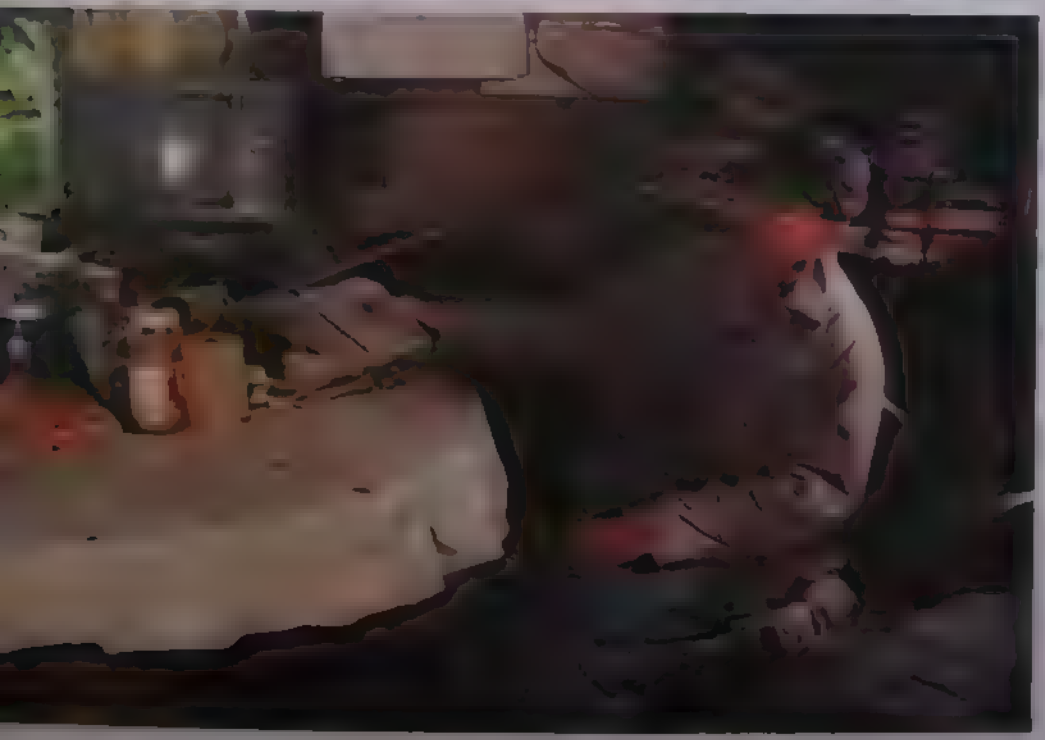


Weak flash

With an automatic flashgun th
be weakened quite simply by
the settings. First set the aperture

Backlighting *In the shot above, the flash has played an important part in showing detail in the room. But the available light is still crucial—the light from the fire picks up detail in the face, and the light from the doorway helps to outline the figure and pick up texture in the floor. For the pictures below, it was important to keep the detail in the background, by careful choice of exposure time, to provide a setting for the children, who were in shadow (right) and so were lit almost entirely by flash in the final shot. There is very little mixing of flash and available light as each lights a different area of the subject.*

Flash proportions. [illegible] easy for the flash [illegible] as well be seen from the [illegible] the top shot made of [illegible] from the flash, although the [illegible] from the [illegible] shower in the lower half of the flash helps to illuminate the face and chest. In the three shots below progressive greater amounts of flash are used, in ratios of 4:1, and 1:1 [illegible] right. It can be seen how the flash is gradually become more [illegible] destroys the [illegible] The normal [illegible] shadows [illegible] allowed to dominate



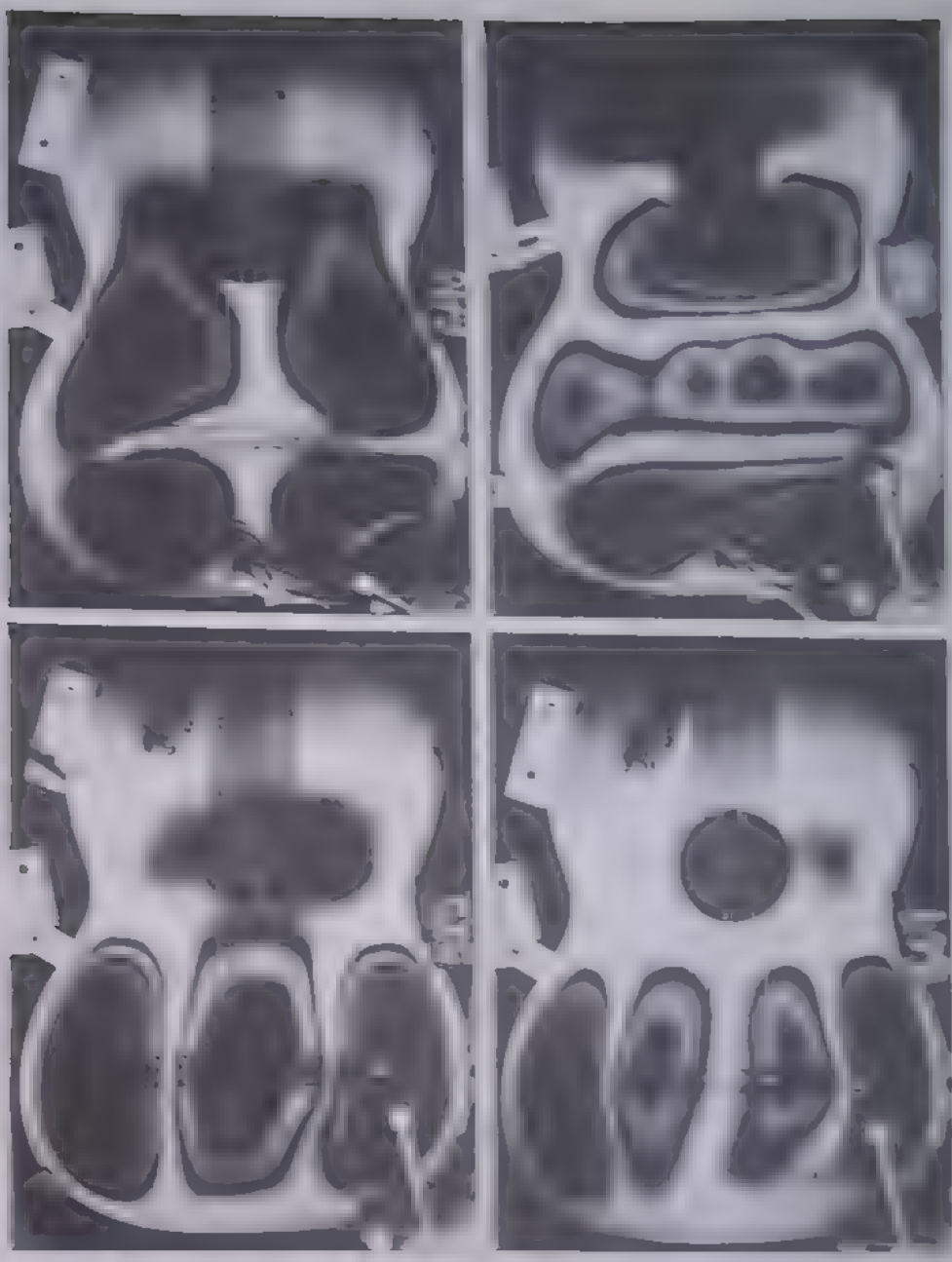
Colour change *Even quite small amounts of flash can be used to clean up colour. Here a small unit was used (right) to remove the unattractive green cast caused by fluorescent lights (left) without changing the atmosphere of the light*

Daylight and flash

World of photography

Holography

Holography has come a long way since Dennis Gabor made the first [illegible] images in the late 1940s. Here we look to produce even more startling results in the future

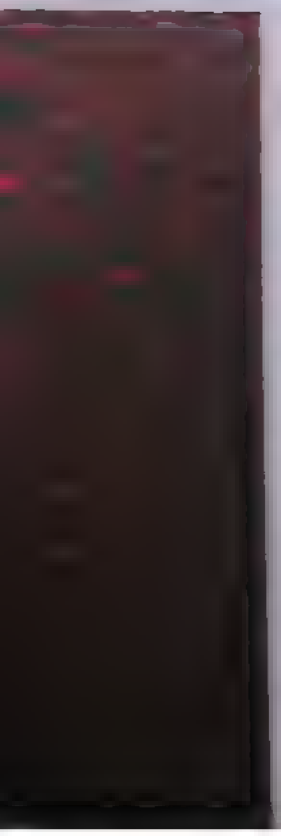


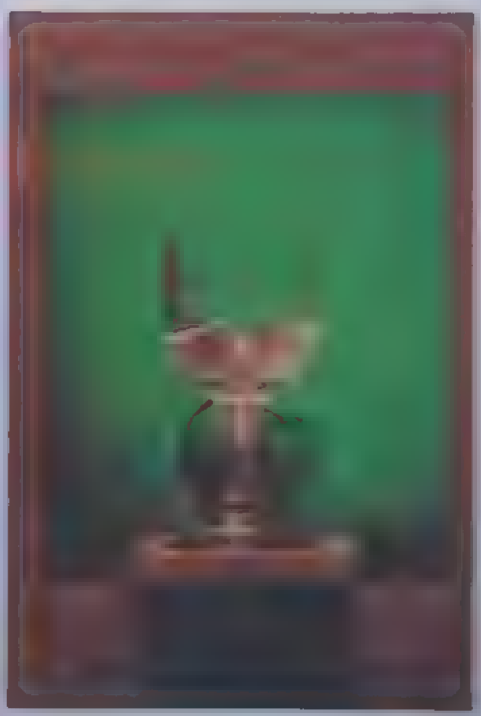
Waves, 1979 The work of Dennis Ashbaugh [illegible] **Mickey Mouse** [illegible] **Guitars** [illegible] techniques he now devises [illegible] **Denis Gabor** [illegible]

Holograms as fine art A [illegible] **Venetian Blinds, 1981** [illegible] **Rainbow, Rainbow, 1979** *(left* [illegible] **Eve's Crystal, 1981** [illegible]

[illegible] should [illegible] and it [illegible]

[illegible] d in neutral tones of grey or black if necessary because the red illumination of the laser might alter the tonal rendition of the subject during recording. This may affect the degree of





Shop window display *A series of white light transmission holograms used as part of a conventional fashion display*

When th
on Earth
hologran

Floating, 1980 *A series of dichromated holograms by Setsuko Ishii, on show at the Toshiba Science Museum, Japan*

Colour mosaics

[illegible] the most recent for Daily are already one. A simple device called a colour printing mosaic could be the answer to your problems.

A filter mosaic in a box

[illegible]

[illegible] is a device which may be particularly useful to colour print [illegible]

A filter mosaic [illegible] is designed for printing those unusual negatives which do not respond well to the preliminary filtration which colour paper makers recommend for the average negative. Kodak for example suggest making a first test with a filter pack of 60Y + 30M when printing Type 2 colour negatives on Ektacolour RC paper but only rarely will this filtration be exactly right for your particular negative and [illegible]

A filter mosaic consists of an [illegible] yellow, magenta and cyan colour [illegible] all stuck together on a multiplate frame. The filters are [illegible] modern materials [illegible] and will [illegible] a variety of different filtrations.

Ideally the colour printing filters you [illegible] your mosaic. If they are not the same there may be errors particularly when strong filtration is involved. In many [illegible]

Exact print?

[illegible]

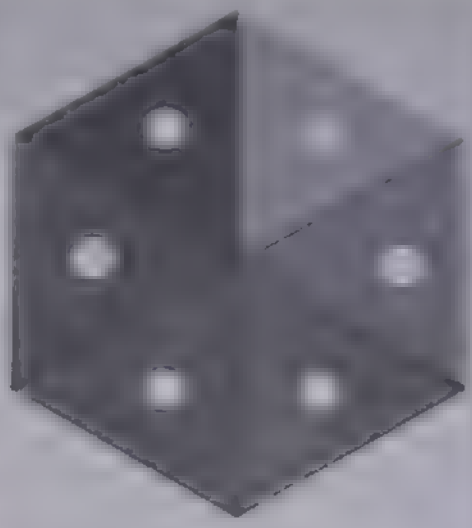
Using a mosaic

The filter mosaic [illegible] piece of colour paper [illegible]

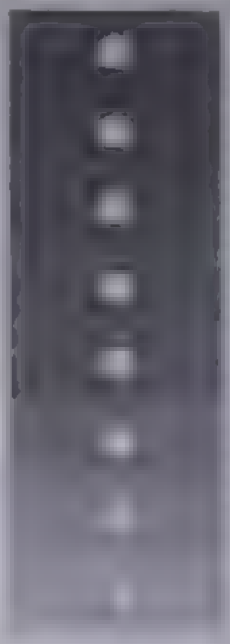
[illegible]

[illegible] 'B' for another UV filter [illegible]

Before we proceed any further [illegible]



Filtering to neutral



Grey comparators These are used to

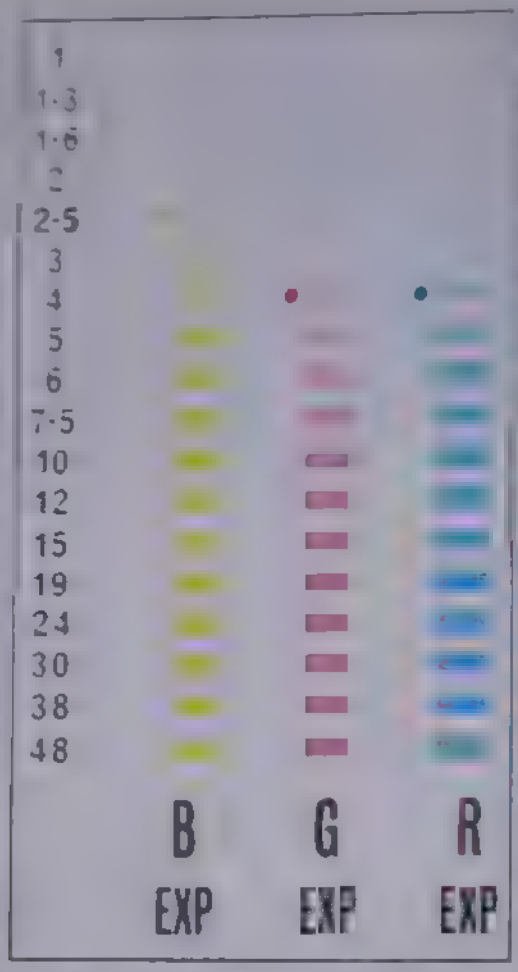
Subject failure

Mosaic for slide printing *This is the result you get when using a mosaic for reversal printing. The right hand mosaic has bigger filter steps, more often used in reversal printing. The left hand one is used for negative printing and for fine tuning in reversal printing*

Filtration changes

Tricolour exposing

Filters—additive or tricolour printing



Printing from slides

Removing unwanted casts

Making your own colour printing mosaics

1. To make your own mosaic use a sheet of adhesive dots for a negative and contact print this on to a sheet of film to make the mask and apertures you need for the matrix

2. Cut 3 cm strips from a roll [illegible] these in sequence along the apertures, one colour at right [illegible] the other (see text)

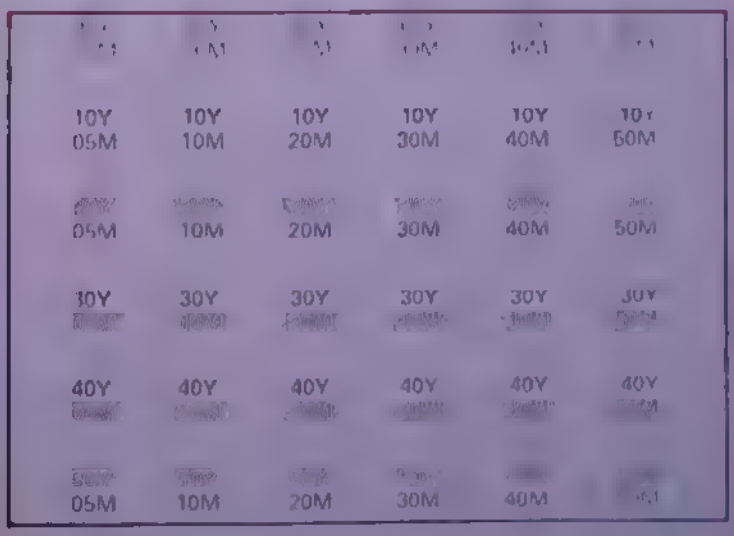
Filter factors for Kodak CC and CP filters

[illegible]	[illegible]	[illegible]	[illegible]	Filter factor		Filter factor		Filter factor		Filter factor		Filter factor	
05Y	1.1	05B	1.1	05M	1.2	05G	1.1	05C 2	1.1	05R	1.2		
10Y	1.1	10B	1.3	10M	1.3	10G	1.2	10C 2	1.2	10R	1.1		
20Y	1.1	20B	1.6	20M	1.5	20G	1.3	20C 2	1.3	20R	1.1		
[illegible]	1.1	30B	2.0	30M	1.7	30G	1.4	30C 2	1.4	30R	1.1		
40Y	1.1	40B	2.4	40M	1.9	40G	1.5	40C 2	1.5	40R	1.0		
50Y	1.1	50B	2.9	50M	2.1	50G	1.7	50C 2	1.6	50R	2.2		

Note: the cyan filters with the suffix '2' are for use with Ektacolor papers [illegible] printing from colour negatives. Cyan filters without the [illegible] for Ektachrome 14RC papers

Making your own filter mosaic

3. *This shows what a mosaic produced in this way looks like. Yellow and magenta filters in strengths 05, 10, 20 and 40 were used singly and in combination*



4. *It is helpful to draw up a table so that any value can be located quickly. This mosaic has [illegible] 30, 40 and 50*

Equipment care

Photographic equipment requires regular care and attention if it is to function reliably. And though some maintenance jobs must be left to experts, there is much you can do yourself with proprietary aids

Dusting and cleaning aids *are available separately or in kits, and range from lint free cloths and lens tissues to puffer brushes and aerosol blowers*

If they d
photograph wil. be inte
working with poor qu
In the first instance th
you obtain from your equipm
depends on how well it is made b
ultimately it is how well you care f
that matters most

Naturally, when you buy equipment you are conscientious about value for money, reliability, specification and performance—that is why reputable brands are more popular than often less expensive ones. Your attitude should not change once you have brought the equipment home. Instead, you should endeavour to keep it serviceable so that it does not malfunction when you need it.

Whether you use your equipment frequently, occasionally or not at all you will need to give some thought to care and maintenance. Placed in a glass case a new camera might be expected

ecau
is mor
And besides
reliablity and
maintaining
condition the
wish to update is an important factor. This does not mean that you should restrict your use of the equipment rather that you should not abuse it.

Precautions and accessories

There are several acccessories that will help to protect your equipment, but their use must be combined with careful handling. Remember that optical goods are precision instruments with delicate mechanisms that must remain aligned accurately. The occasional bump against a lamppost or soaking in a pool of wine

carrying strap should be
to the camera lugs rather than the case.

It is not uncommon to see expensive cameras being carried on cheap shoddy straps with soft metal catches and weak attaching rings. Even a mild tug on the camera could send it crashing to the ground. Repairs cost much more than a strong, well-designed strap, so the purchase of one will be money well spent.

A narrow strap is uncomfortable round your neck unless it is fitted with a rubber pad. Many photographers favour a wide webbing strap which is strong and comfortable and can be removed quickly when the camera is being used on a

Routine cleaning

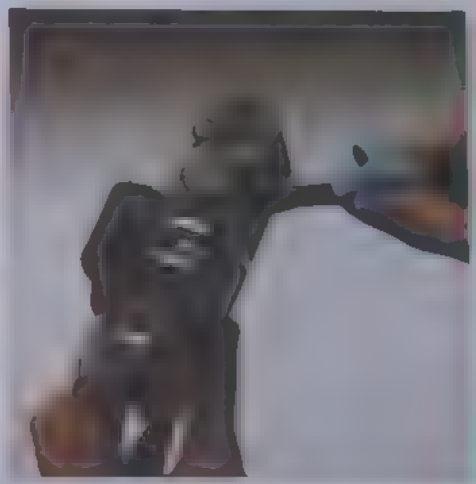
Brushes

Blowers

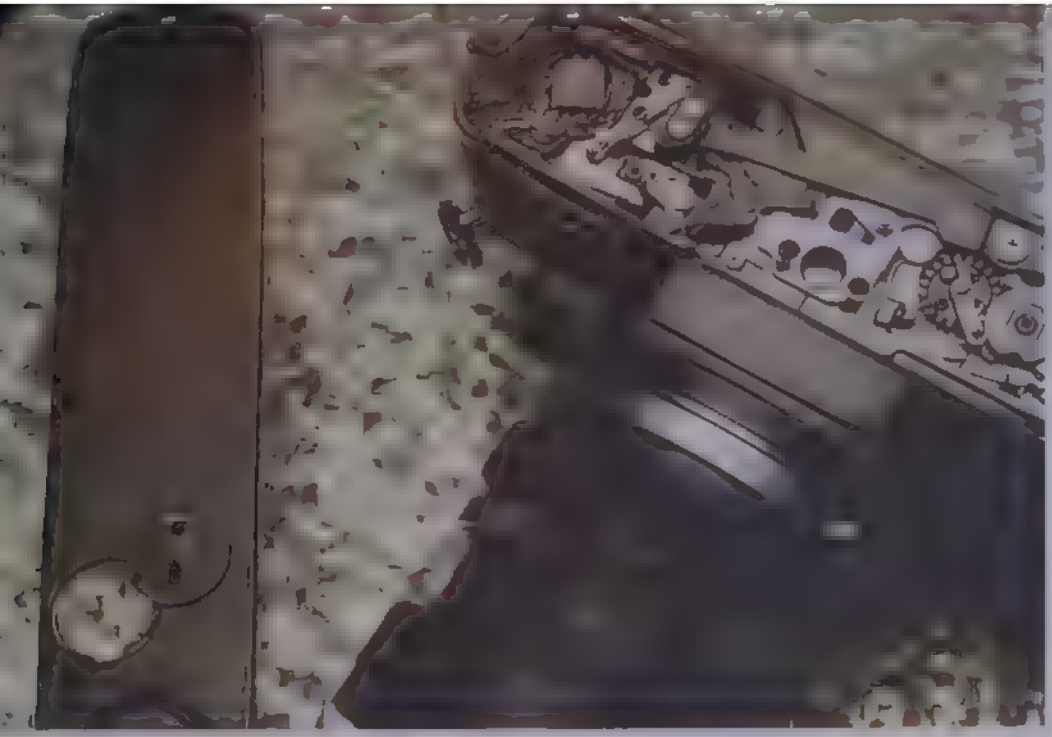
Lenses

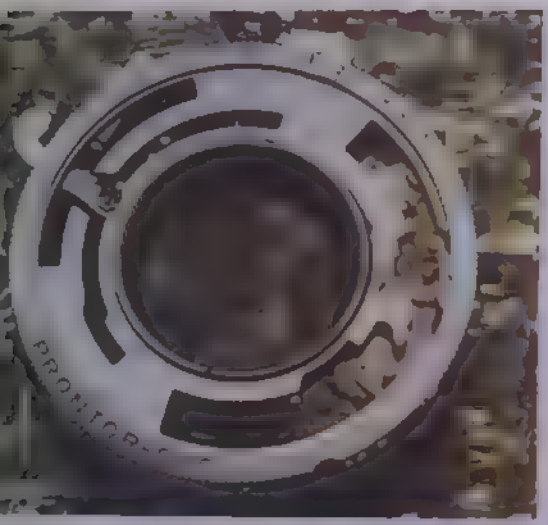
Lens fluid

Lens tissues



Body exterior





Uncovered *Do not leave the motor drive plug off or dirt may enter and ruin these delicate parts*

Corrosion *The result of not thoroughly cleaning equipment that has been used in salty atmospheres*

Routine care

[illegible]

[illegible] turn in a gad[illegible]

[illegible] you operate the equipment.

Meters also should be [illegible] shock. The moving needle type is more prone to damage, so the neck cord usually supplied with the instrument should be used during measurements. Shock is not a problem with solid state meters, because they have no moving parts. The major source of trouble comes from old, leaky batteries.

All batteries used to power photographic equipment should be replaced regularly—preferably at least once a year and should be removed when the equipment is not being used for an extended period. This might also be the time when you clean and maintain your camera routinely, but extensively used equipment or that used in [illegible] Look for fragments of film [illegible] or insects that might jam the [illegible]anism. Inspect the mirror but do not [illegible]

[illegible] wear as well as foreign objects. Insects or small specks of dust or paint [illegible]ged between optical elements are a nuisance more for the anxiety they cause than for the extent to which they impair performance. In fact, such objects need to be considerably larger than about a millimetre in diameter to justify the expense of dismantling a lens to have them removed.

[illegible] you have abused your equipment, the chances are that you will detect only a small amount of dust on the inside of a typically used camera. Any cleaning should be carried out with the utmost care, bearing in mind that on no account should you touch the mirror, shutter and moving parts. Using a soft, pencil sized brush, remove as much dust as possible from the inside of the camera, without touching the mirror. The mirror is made of aluminium which marks easily and can be cleaned properly only by an expert.

If a film fragment sticks in position it can be loosened with a tuft of synthetic cotton on a tooth pick. On no ac[illegible] you try to loosen fragmen[illegible] [illegible]ommon cause of malfunction is [illegible]l applied by well-intentioned users. Your camera operates dry, except for a [illegible] key points, which are [illegible] only after extensive diseas[illegible] not include an oil [illegible] maintenance kit. If the mech[illegible] [illegible] a speciali[illegible]

[illegible] you can buy [illegible] blow as well [illegible] [illegible] loose [illegible] should not [illegible] the blowing [illegible] [illegible] has c[illegible] [illegible] can be directed into [illegible]ly but a [illegible] important [illegible] and blow [illegible] This is all the [illegible] of the camera [illegible]

[illegible] or handkerchief. However clean these appear, they might still contain grit or abrasive tissue which can damage the [illegible]ating. Equally likely, a small particle of grit might lodge invisibly on the coating, and be ground into it.

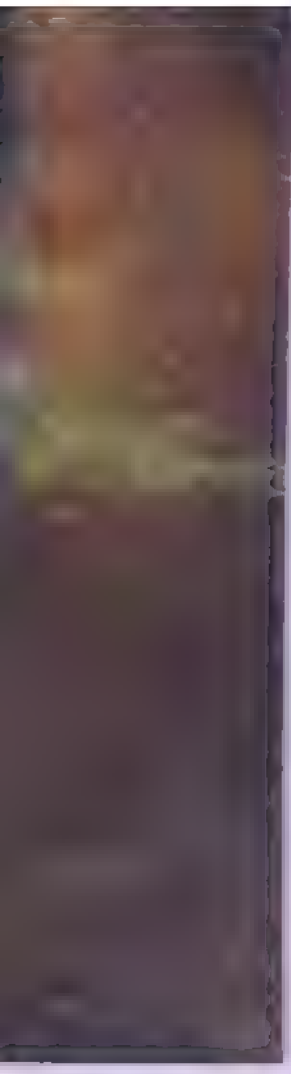
To clean the glass, blow it gently and then wipe it gently with a lens tissue moistened with a drop of lens cleaning fluid. More than a drop of fluid is excessive, and will only compact dust in some areas. It is a good idea to use more than one tissue. Use the first one very lightly in case there is grit on the lens, then polish wipe with the second.

The camera can now be reassembled with dust caps fitted where necessary and the body exterior cleaned. All that is needed is gentle wiping with a soft, fluff-free cloth. Do not polish or wet the body nor use chemicals or detergents on it because these could seep inside and cause damage to the many delicate internal mechanisms and circuits.

Saturday conditions

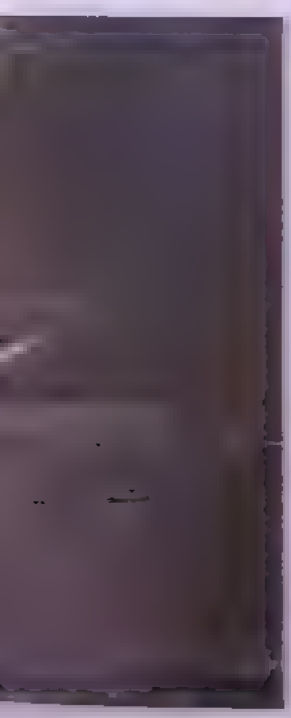
Scrambled You cannot strip a modern SLR without professional skill and equipment. If you do you will probably ruin it and a repair will prove costly

River ramble

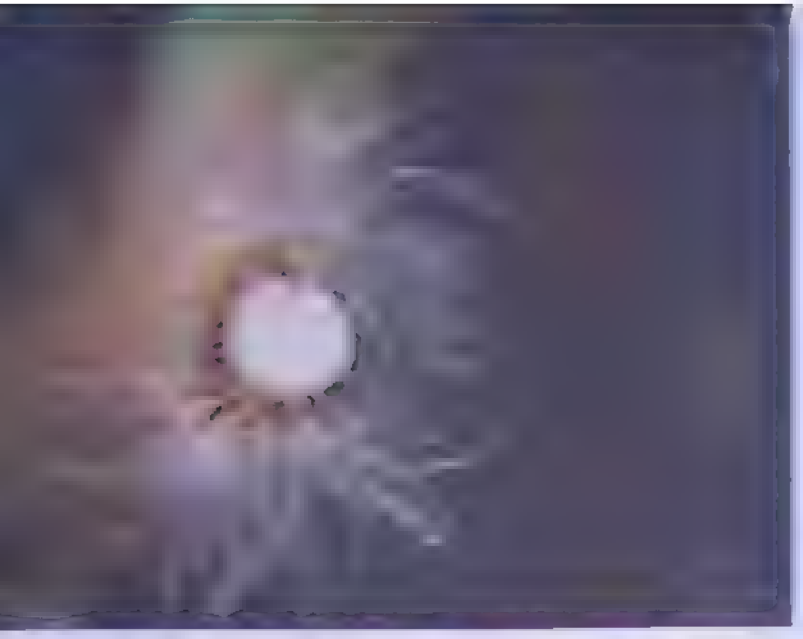


The river [illegible]

[illegible]



Versatile tripod. [illegible] **Mute swan** [illegible] **Iris flowers** [illegible] **Willow part** [illegible]



Construct seed head

Dandelion

Coot

What went wrong?

Babies

A popular subject but one that is hard to photograph well. Sally Greenhill comments on these baby pictures and offers her own advice

The photographer has caught the baby's attention very cleverly. I always find the biggest problem when taking portraits of babies is that either you lose their attention completely when you disappear behind the camera or they make a lunge for the lens with their sharp little nails! What a pity that the harsh lighting rather spoils the atmosphere that the photographer has thus created.

I always try to photograph babies away from direct sun or window light. Indoors I place them near an expanse of white wall with the sunlight bouncing off it – this gives a beautiful soft light which suits the baby's delicacy much better.

I think that a vertical format might have worked better in this picture. Babies' hands are almost as expressive as their faces especially when their attention has just been caught, as here.

[illegible] of [illegible] baby doesn't look a [illegible] one to play games to [illegible] Dolls and words [illegible] always gives a de[illegible] the baby at the moment of a [illegible] wonderful expression [illegible] well is 'clap hands together, clap hands away' but here you are more likely to get the adult in the picture too.

World of photography

Paolo Koch

Taking good pictures is only one aspect of Paolo Koch's photography. For him transforming his pictures into documents is just as vital and has given him the freedom to photograph the subjects he finds most interesting

[illegible]

[illegible] ture is al[illegible] [illegible] ich better ch[illegible] [illegible] ned As he says, [illegible]

[illegible] ss of turning his pictures into documents is almost as important as the picture-taking itself Indeed the ability to remain self supporting in an extremely competitive market is largely due to the income he gets from the sale of his stock pictures It is also due to the detailed captioning of his pictures and the extensive cross-referencing system that he has developed with the aid of a home-based computer

This kind of thoroughness is also applied to the photography itself If Koch is covering a subject which he feels deserves more time, he prefers to have the freedom to take that time on the spot He may also return to a subject again and again, often in different parts of the world, if he is preparing material for a

Ancient and modern *Sheep graze quietly in front of the flares which mark the Ahwaz oilfield near Abadan in Iran*

[illegible] The [illegible] [illegible] K[illegible] [illegible]

[illegible] rked with novelist and philosopher André Malraux organizing travelling art exhibitions for the French Cultural Affairs office To help his father, Paolo started to take pictures of art and architecture for reference Then at the age of 22, he suddenly had to assume complete responsibility for an exhibition of Chinese art when his father fell ill Even though he was so young the French authorities decided he was probably the person best suited to do the job and allowed him to take over

He found himself travelling in China at a time when few foreigners were allowed entry It was the beginning of the Cultural Revolution and the Chinese insisted that for every museum or cul-

[illegible]

popular e[illegible] by Larous[illegible] sort of mate[illegible] helped hi[illegible] graphy H[illegible] Revolution [illegible] virtually [illegible] allowed [illegible] sell his photo[illegible] world s most p[illegible] as *Life Time* [illegible] *Match*

This was a superb break for a young photographer but Koch realized that they were using his work because of its content not because of his abilities as a [illegible]

a story or to interrupt one
n something more interesting

a in 1979 he had to leave the

The Indus river valley *A panoramic view of the spectacular scenery that surrounds the river in the far north of Pakistan near its Himalayan source*

Chuckwagon race *Koch positioned himself opposite a bend in the track to capture the movement and excitement of these Canadian wagon races*

[illegible]

He [illegible] Buddhist iconography. He follows it from its origins in Greece to Japan, after it had traversed a continent, and shows the influences it underwent along the way. Like many of his projects this combines his knowledge and interest in art history with his photography.

Paolo Koch has a very particular [illegible]

Great Wall of China *Chinese soldiers reenact scenes from the famous Long March of the Communist Army in 1933-4 for a contemporary film*

Kyosakku *The hands of a Zen buddhist monk composed in the meditation posture 'awakening spirit'. By eliminating all non-essential information from the picture Koch has created a strong portrait*

[illegible] He [illegible] Koch [illegible] 35 mm [illegible] He shoots an average of ten rolls of film a day, using 64 ASA Kodachrome or 400 ASA Ektachrome He rarely uses 25 ASA Kodachrome, preferring the extra speed of 64 ASA He feels that the difference in grain between the two is minimal.

Koch is keen to emphasise that although technical [illegible] and equipment are important, to be a successful photojournalist requires more than knowing how to photograph well It is also extremely important to know how to sell pictures in a vast and [illegible] can handle [illegible] is also [illegible]

Ponte Vecchio *A classic sunset over the River Arno in Florence is enhanced by the silhouette of a boatman making his way under the bridge*

Children of the Swat valley, Pakistan *Koch's shot points out that the fair-haired child in this informal portrait shows the racial influence of the Greeks of Alexander the Great's 4th century invading army*

Understanding...

Fixing the image

After development, unwanted light sensitive particles remain in the emulsion. If the picture is to remain clear and unfogged, these particles must be removed by 'fixing'

Basic fix

Tessa Musgrave

Clearing *On newly developed film, the image is veiled by opaque silver halides but the image clears as the halides are turned to colourless silver salts by the fixer*

Acid bath

Hardening

Stone aged *For rapid fixing and to avoid washing, photos can be temporarily stabilized, but they quickly deteriorate unless they are fixed properly afterwards.*

High speed fixing

Improve your technique

Studio still life

Good techniques and imagination are the hallmarks of successful still life photography. These can only be developed through practice, but there are some basic techniques which provide a useful starting point.

every aspect—the lighting, the appe[illegible]ance of the subject th[illegible] the angle of view. An expert can make virtually any subject look good while on the other hand even a beautiful subject can look dull if the shot is badly set up and poorly lit. So this article covers some basic techniques from which you can develop your own approach.

Choosing the camera and lens

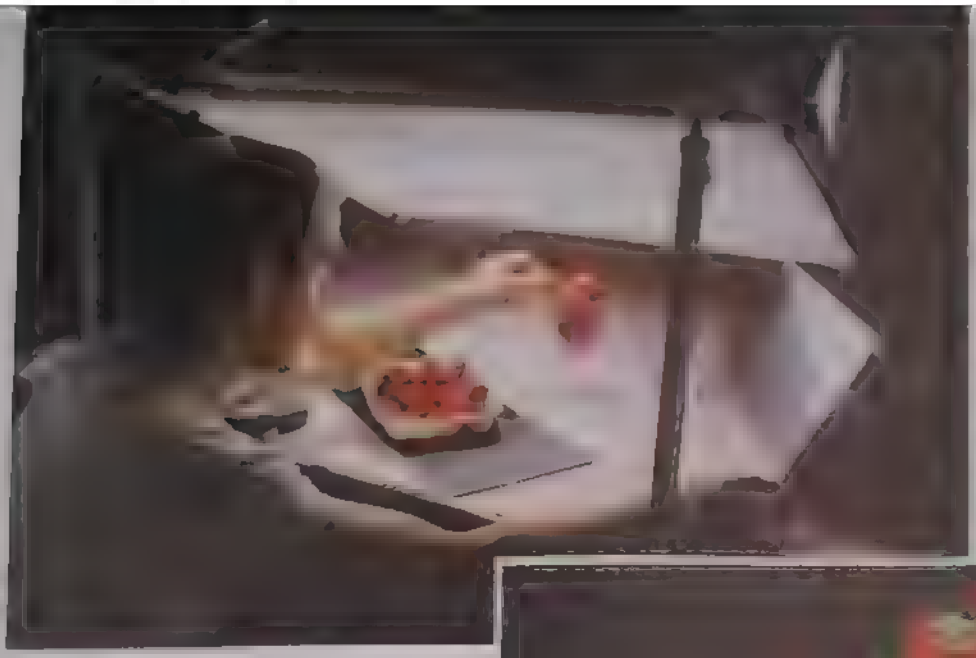
A standard 35 mm camera is quite suitable for still life w[illegible] you use fine grain fil[illegible] formats are preferable for the [illegible] best results. All modern SLR cameras [illegible] us to a reasonably close distance w[illegible] the standard lens, and a macro lens [illegible] only

Simple and contrived *The top picture is a classic still life—simple, natural and requiring no special techniques. It relies for its effect on colour and composition. The lower shot shows the other end of the spectrum in that it relies heavily on clever photography and an amusing idea*

Window light *You do not have to use complex lighting set-ups. With this type of subject the natural light from a window is often more appropriate*

Dave King

Domestic fish fryer *Diffused top lighting is very popular for still life work, and it is easy to achieve even with small flashguns. All you need is a frame covered with the diffusing material clamped above the subject (left). Two or three flashguns are then taped to a bar above the diffuser, the best positions being found by making experimental test shots*



Gradual background *This is the type of lighting used a great deal by professionals. Tilting the diffuser forwards (above) means that only the foreground is lit, the light fading off towards the back (right)*

Keep it clean

A [illegible] deal of still life work, however [illegible] of space and [illegible] use a table-top, as you [illegible] In this case you may be able [illegible] of a room. But whether [illegible] working in a studio or in the [illegible] cleanliness is vital.

In photographers' terms, there is nothing more annoying than having spent a lot of time setting up a still life only to find that the transparency shows fluff, dust or a hair in a most conspicuous place. Apart from the obvious, like not smoking, keeping animals and children away, floors and windows shut, etc, there will still be occasions when dust settles in the wrong place. Dust off, aerosols, blower brushes and the like are very useful, but do be careful that you do not just blow dust from one part of the set to another.

Dust and fluff on velvet, flock paper or other fabrics is best removed by winding sticky tape round a finger of the hand to make a sticky brush and then picking the dust off. Some types of plastic, notably perspex, become charged with electrical static quite easily, through routine handling. An anti-static cloth or brush should be used to neutralize the dust-attracting charge. The same brush can also be used for glassware and indeed many other still life objects.

Obstinate fingermarks can be removed with surgical spirit or acetone but as these are also solvents for some substances, especially plastics, be careful. If you use polish for cleaning, note that some leave waxy deposits which show up on film, so test for this first. Clean clear plastics only with soap and water, and dry then with a clean chamois or use a special plastic-polish and a clean, soft duster. Some of these polishes are also anti-static, which helps prevent static build-up at source.

Choosing the lighting

Old photographic books [illegible] showed a list of [illegible] worth [illegible] black and [illegible] different [illegible] prints, and [illegible] labelled [illegible] are even quicker, if you ha[illegible]

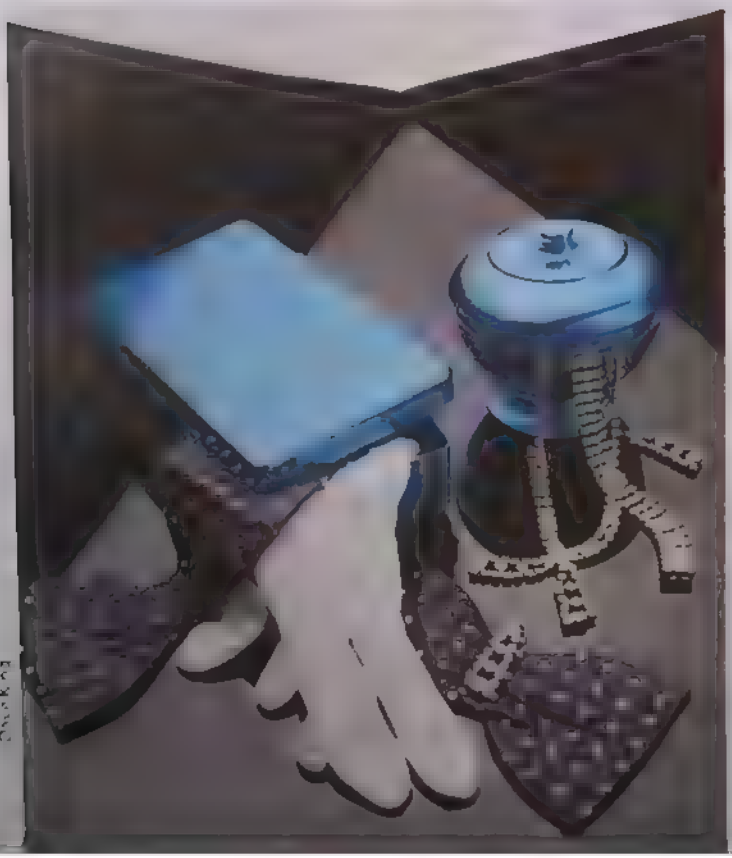
Front lighting is [illegible] life work, as a very hard shadow results around the object when seen by the camera. This shadow can only be lost if the background is black. Side and top lighting are also very hard and can be used very effectively to create dramatic highlights and shadows. However three-quarter lighting is probably the safest compromise.

All these lighting positions will give long shadows, but shadows can be reduced by moving the main light to a three-quarter position above the subject, instead of at lens level, to achieve good, basic, even illumination. Similarly, need rep[illegible] often and produce a [illegible] of heat. Quartz Halogen lamps, [illegible] are [illegible] but they burn [illegible] expe[illegible] electricity and pr[illegible] heat.

Some [illegible] graph b[illegible] such [illegible] a window-sill [illegible] streaming in th[illegible] light has a blu[illegible] daylight film to get the [illegible] balance. In such [illegible] artificial fill-in lamps [illegible] throw will appear [illegible] daylight film.

Electronic flash can be [illegible] effectively for still life [illegible] it as a fill-in light when using availabl[illegible] daylight, or you can [illegible] studio using modelling lights and then expose the shot with the flash. There are two main types of electronic flash and the on-camera type is virtually useless for still life work, except as a fill-in. Flash units are often supplied with accessories but rarely do these include a modelling light. Without this, subject lighting becomes a matter of luck. However now

Setting up the lighting



Vanishing trick
To give the effect of a large space in the confines of a studio, the boards used above were made in miniature and tapered, giving a result similar to an ultra-wide angle lens—even though an almost standard focal length lens was actually used

Reflected light
If you use a reflective background the lighting will form an effective part of the background. The bright patch here is a reflection of the fish fryer flash diffuser—part of which can be seen at the top of the picture

already mentioned. Most [illegible] expensive and heavy [illegible] order to support the weight. [illegible] domestic conditions [illegible] have holes in the [illegible] heads and a frame. Otherwise [illegible] subject, could be between two [illegible] may be sufficient. These stands [illegible] base weighted for safety. [illegible] bricks in a plastic carrier bag.

Still life subjects benefit greatly from a 'falling off' or gradual darkening of the background. The prime requisite [illegible] sufficient space between subject and background in order to effectively [illegible] this area into shadow. Camera viewpoint affects the position of the soft-edged horizon. A fall-off background can be achieved by masking the main light from the background with black card or board. This mask is placed forward of the main light or, in the case of top lighting on its backedge. A coarse, saw-toothed edge to this mask will soften the line of its shadow.

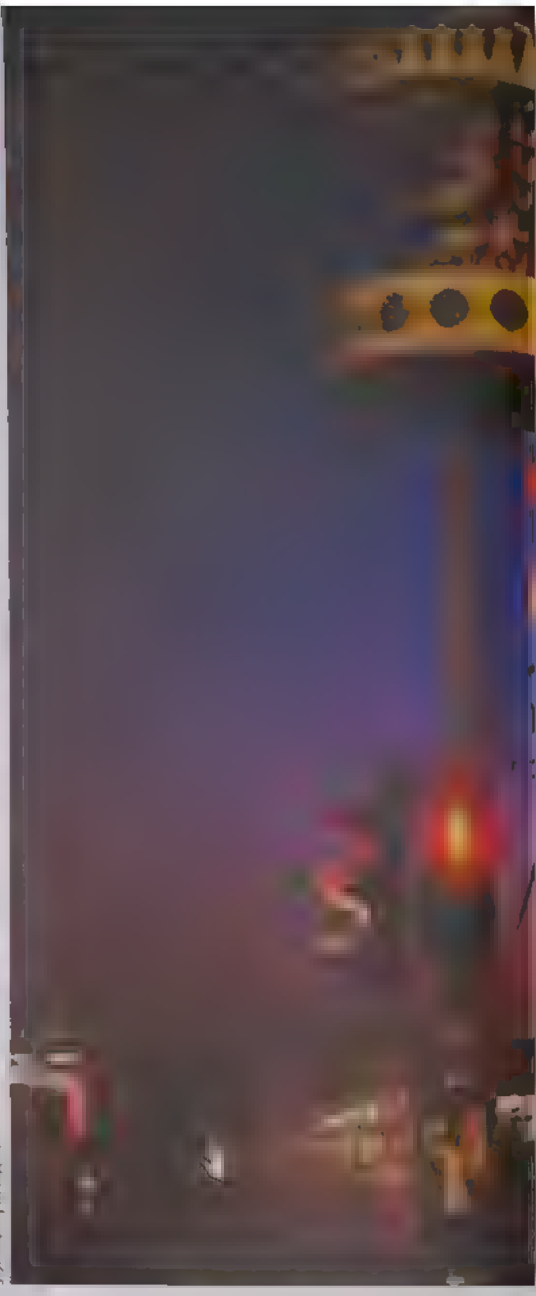
The full range of lighting techniques for still life is dealt with in part two of this article (see pages 2140 to 2144—see also pages 1613 to 1616 and 1883)

Creative approach

Beside the seaside

Whether your interests are in photographing seascapes bathed in dramatic light or candids of people at play, beachside resorts offers unlimited subject matter

Porch *A resort area is full of subjects that can be photographed purely for aesthetic reasons—their shapes and the way the light plays on them*



pea

ie in its [illegible] mdating [illegible] especially in winter The atmosph[illegible] the sea is unique and the photographer [illegible] elf or herself at its whim A [illegible] go there and take photo [illegible] t even necessarily mean that you know e ctly what you are going to end up with You go there to steep yourself in its character and to end up with a photograph with a particular feel

On the beach alone there are numerous photographic opportun[illegible] The rippled contours in the sand caused by a receding tide can be used either as a subject in itself or to lead the eye—perhaps to a solitary figure walking along the water's edge Low sunlight and a low viewpoint will make these shapes more pronounced and if you photograph the beach when the sand is still glistening with the previous receding tide, further impact can be achieved—especially at evening

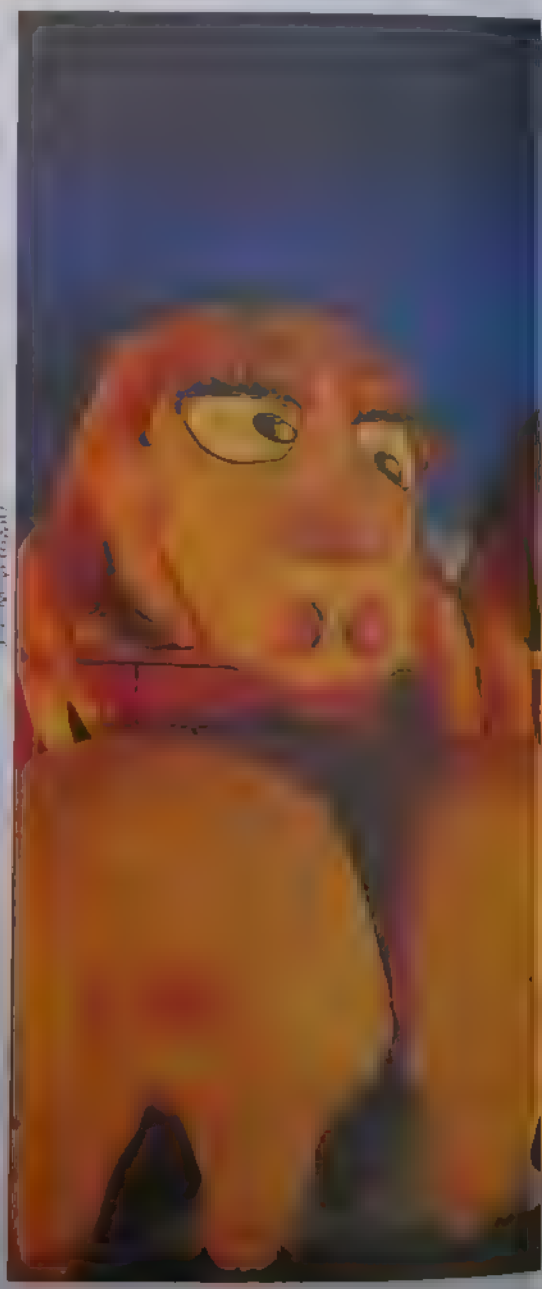
Beach lights *The dramatic colours of a western sky, at dusk, make an ideal background for shots of seaside illuminations.* **Pier** *Although the day was misty and overcast here, the photographer used a graduated filter, one inverted, to colour both the foreground and the sky.*

Jon Meyers-Wilz

Bay and sky in sunshine *This shot is part of a series which highlights the way the changing light alters the entire appearance of the scene—compare it with the same scene shown below*

Illuminated pigs *The orange cast from the tungsten lighting made this shot even more bizarre and the light on the pier amusements contrasts with the dramatic sky in the background*

Bay and sky in storm *The menacing, oppressive feel caused by the stormy sky showed this scene in a totally different light A wooden, large format Deardorff plate camera was used for this series*



Beach scene *This shot is made by one critical moment the photographer chose to shoot—the dog in mid-air while everyone else was heading away*

Wading in the waves *Another example of waiting for the right moment—the girl looks particularly determined despite the looming waves*

Two ladies *At a seaside* [illegible]

Ian Berry [illegible]

Cricket *Black and white film is particularly suited to capturing people absorbed in their recreation—here the photographer noticed the woman at her game and waited to find exactly the right viewpoint and timing.* **Changing** *Look out for priceless humorous* [illegible] *and try to anticipate the best moment to shoot*

Sirkka-Liisa Konttinen

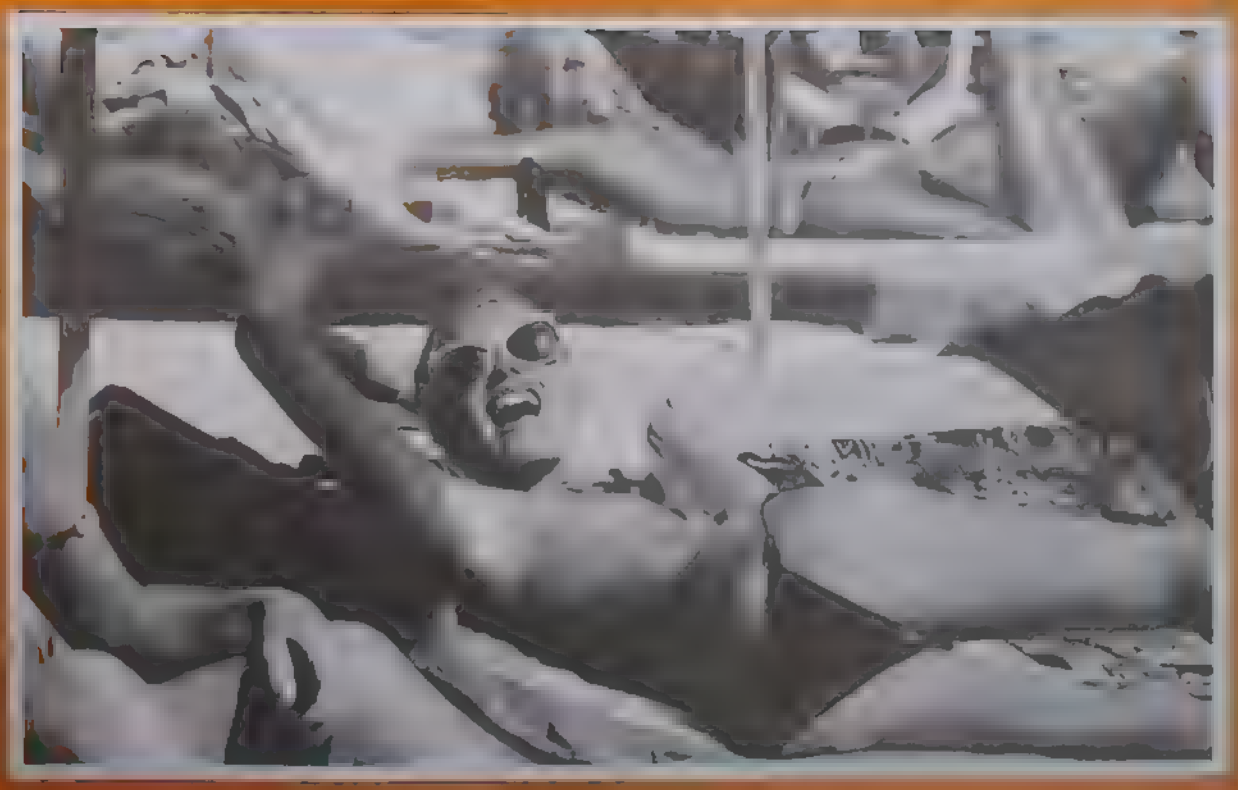
the beach or [illegible]

ground Twisted driftwood or pieces of wreckage can be photographed in a [illegible]

No matter what your interests are [illegible] in photography and generally, you will [illegible] broad scope for creative photographs

Woman and dog

Sunbather *A [illegible] people who react [illegible] than exaggerated [illegible] to the sight of a camera. These attitudes can make very striking photographs – once again black and white films are ideal for this*



Drying prints and film

Although often taken rather too much for granted, film and print drying is an important part of the overall processing routine, demanding careful techniques, and should not be skimped or unduly rushed

[illegible]

The purpose of drying is to dehydrate a print or film emulsion saturated with water, leaving it with a residual moisture content even when dry, at which it becomes stable and safe for storage and further handling.

Film drying

Whatever method of drying you intend to use, first give films a final rinse in wetting agent. With powder, surface tension is reduced, allows faster evaporation and [illegible] washing aid, Kodak Rinsaid is a substitute for commercial wetting agents such as Agepon or Photoflo. Unless you can keep the concentration very low, a drop or two is quite sufficient even in a gallon of rinse water.

To dry films, first remove excess water from the surface of the film. Use a [illegible] squeegee blade, there is no danger of damage if you keep it soft in water and shaved in hot water. Strictly speaking, the rubber blades are soft and flexible.

Many people prefer to use a finger wipe as any dirt on the film can be felt by the sensitive tips of the finger and the film can be rinsed before damage is done. For the beginner, hold the film up with the other hand and use the first two fingers of the skilled hand to wipe the film. Start at the top and slowly [illegible] fingers down.

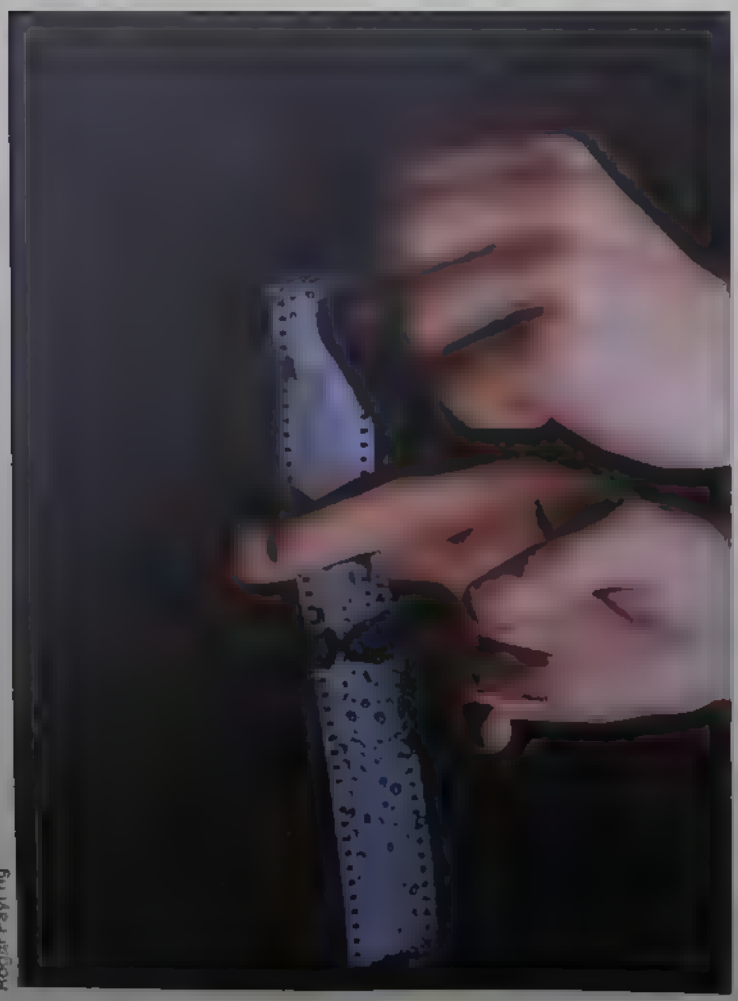
Work over a sink or tray in case you drop the wet film and be quite sure that the emulsion side is facing your second finger. The key to success is to be able to use a light, smooth contact, not a gripping pressure, maintained evenly [illegible]

[illegible]

Forced drying

Films are [illegible] processed [illegible] used to speed drying. [illegible] moisture [illegible] emulsion surface very quickly [illegible] the surface and other layers wet. [illegible] stresses which may [illegible] delamination [illegible] layers.

However heated film driers are [illegible]



Roger Payling

Home-made drying cabinet *A simple 'hot box' film and print drying cabinet can easily be constructed at home—you may even be able to convert an existing cupboard Although this design relies on tungsten bulbs for heating a filtered fan heater could be used The print racks are stored in the base when film is being dried then racked in the cabinet below ready for use*

boon in a busy darkroom (see page 2058), but you should follow the maker's instructions closely You can make your own using a small cupboard heated by a tungsten bulbs, employing a fan and filter system for greater efficiency The lack of excessive heat will help your film dry 'naturally', so increasing its stability and permanence This cabinet could be designed to accept prints also

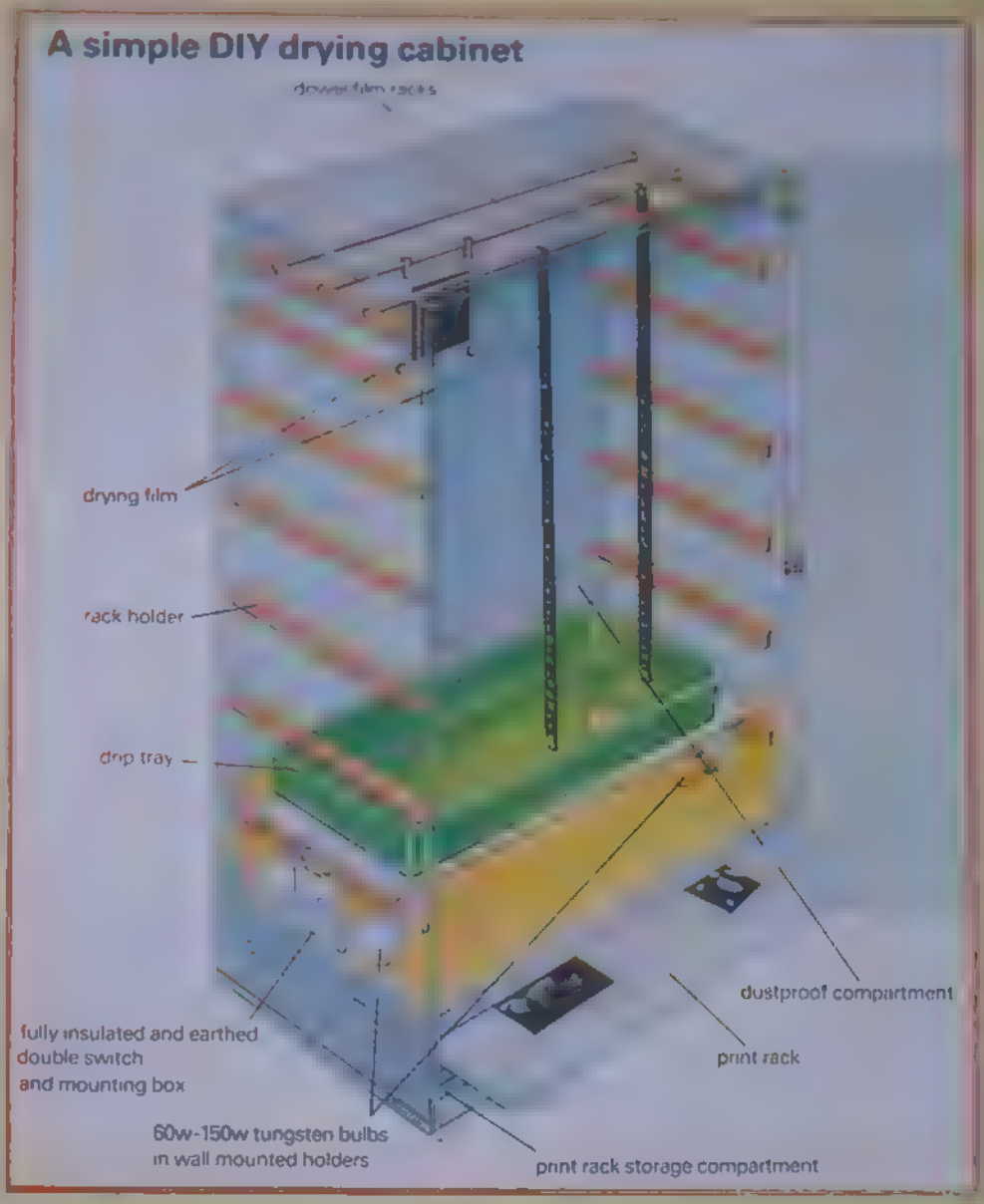
Rapid drying

Drying can be speeded up by immersing film in a solution of eight parts industrial meths to two parts water for not more than five minutes, otherwise the film base may start to soften Do not use undiluted meths as the emulsion will become cloudy and the base distorted. Using meths is not a recommended procedure unless the circumstances are exceptional and rewashing and proper drying are needed as soon as possible afterwards to limit the risk of cracking the emulsion

A proprietary methyl alcohol is available for the same task Tetenal Drysonal rapid dries film within two minutes by accelerating the rate of evaporation. No rewashing is said to be needed—you simply immerse the film then dry it. This reusable liquid may have a hardening effect on the film, like meths. It is a handy thing to have on your shelf, though

Drying marks

In hard water areas, lime marks left behind after droplets of water have dried can be a problem—especially when wiping down is inadequate Overcome this by immersing the film in a one or two per cent acetic acid bath for a couple of minutes before drying. Photo-flo and other wetting agents should not be used or reticulation may result since they are alkaline



Jeremy Banks

Drying papers

Prints should be dried in air for archival storage (see pages 1922 to 1925) But this can take a long time and it is common practice for normal work to speed up the process by using an electric fan, hair-dryer or drying cabinet Heat drying RC paper gives a higher sheen but this applies to semi-matt and gloss finishes especially. Wiping prints down with a sponge or print squeegee helps considerably since water on the surface tends to form droplets which slow down natural drying and can mark prints being dried with heat Resoaking and drying may correct this

RC papers can be put on to drying racks and then left in a warm dust free

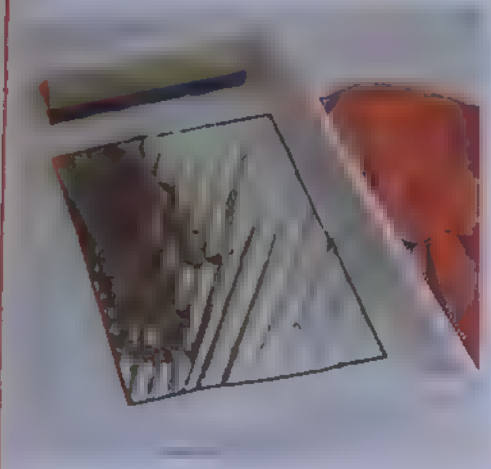
Finger wipe *A finger wipe will remove a good deal of surface water—but there is always a danger of local accumulations*

Film wiper *A film wiper blade is the most efficient method of removing surface water, and helps reduce the drying time*

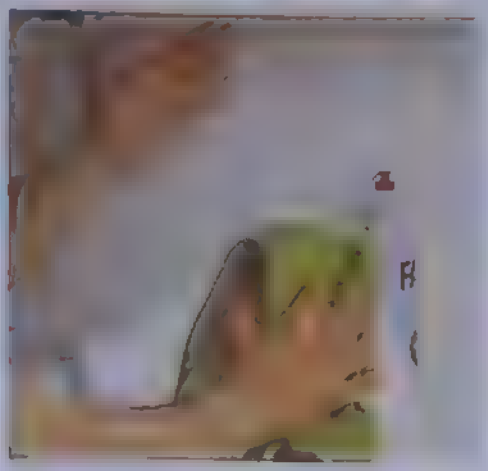
Wetting agent bath *Always give films a quick rinse in a bath containing wetting agent, or just a drop of detergent*

Cleaning wipers *Film and paper wipers should be rinsed before use Inspect the blades for the presence of grit*

Glazing procedure (cold method)



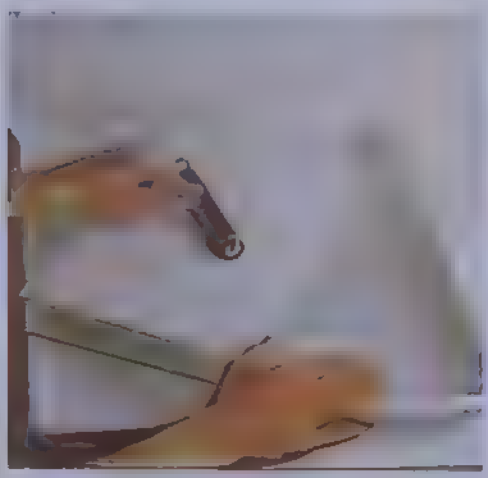
1 Procedures for hot or cold glazing are virtually identical but the economy of the latter method makes it ideal for the odd print. Start by soaking the print



2 Carefuly clean the glass (or the glazing plate in the hot method) using warm water and detergent. Then polish the surface clean and dry

3 Either place the entire sheet in the dish containing the print or, as here, at an angle to it. Slide the print emulsion into contact with the glass (or plate)

4 Use a flat squeegee blade to remove excess surface water and to bring the print into firm overall contact with the glazing surface



5 You may find that a rubber roller squeegee is more effective for pressing the print flat. Either way, work from the centre outwards in all directions

6 Finally, place a sheet of blotting paper over the print and weigh it down lightly. At this stage a metal glazing plate would be placed in the dryer if using the hot method

Roger Payling

place. Alternatively, RC prints may also be passed through a specially made radiant heat dryer—or simply fanned dry with an electric fanheater or hairdryer

Glazing prints

Fibre based prints can be dried naturally in air (see page 325) but it is often much more effective to glaze glossy-surfaced material—especially for presentation work The real value of glazing is that it yields an obvious extra sparkle to prints. Depth of blacks is also improved The glaze is very delicate and care must be taken to avoid contact with all forms of moisture, fingerprints included

There are two types of glazing machine flatbed and rotary (see pages 2058 to 2060) Both work on the principle that a glossy surface of a print held and dried in close contact with a smooth polished surface will assume the same smooth polished finish The polished surface of a glazing plate must be kept [illegible] clean, lest it not marks and transfer to the print surface, resulting in a pitted glaze which can ruin the effect of an otherwise perfect print

If you are using a flatbed glazer, begin every glazing sequence by thoroughly cleaning the glazing plate. Polish off rough deposits left after a warm water and soap wash by nothing more abrasive than French chalk, or use your finger tip then rewash the plate in warm soapy water and rinse briefly Blot the plate with absorbent paper or towel Using a soft dust-free cloth, fine polish the plate with gentle circular action

Place prints to be glazed in warm rinse water, free of impurities—filtered or distilled water from the kettle is ideal—and add a few drops of a wetting agent or washing up detergent Allow prints to soak for a while Always be sure your prints are thoroughly washed before glazing or stains are a result

Then place the glazing plate in the same dish as the prints and slide the latter onto the plate while both are under water Remove the plate and prints from the dish to a suitable worktop Use a sponge or towel to mop up surplus water and, using a flat squeegee blade, squeeze out water from between the prints and plate, taking care always to work outwards from the centre of each print. Mop up surplus water as you go Transfer the glazing sheet to the dryer, and position it beneath a correctly tensioned cloth apron Set the thermostat according to paper type—but as low as possible—and switch on the unit

It remains now only to wait long enough for drying to be completed It is very important not to rush this stage, and if you lift the apron too soon you may get localized increase in drying, or print lift, the combination of the two resulting in 'oystershell' marks. This is where the glaze is physically broken in progressive and numerous lines as the slower drying areas of the print are gradually released from the plate This can be prevented by beginning glazing with [illegible] pressure [illegible]

drying time of the print when the unit is eventually switched on

If glazed prints are badly pitted—a frequent problem when wet prints are laid directly on a hot dry glazing plate, and badly squeegeed—resoak the print again, and reglaze

Occasionally prints will stick to the plate If this happens, allow the plate to cool and, if prints stay fast, return the plate once again to the warm dryer this does not move it, submerge the plate in warm water to soften the emulsion and then peel off the print after a generous soaking period If parts of the print emulsion remain stuck despite this use your fingernail to lift up a corner gently and peel off the emulsion Using more force than this may cause scratching on the plate This, in turn leads to poor quality glazing and increased risk of sticking, so a scratched plate should be replaced as soon as possible

Cold glazing is an alternative method but takes longer, and you follow the same procedure except that you need not use hardening fixer You can buy glazing fluid for this method—your print is soaked in it before being placed into contact with the glazing sheet which has also been wiped with the fluid This helps promote drying, ensures a good finish and prevents sticking

You must use a fairly thick (4 mm plus) sheet of good quality plate or float glass to cold glaze your prints As a precaution this should have its edges ground smooth so you will not cut yourself when handling it. Clean the glass with warm water and washing-up detergent, rinse, let it dry in air (towels may leave lint) then wipe it down with glazing fluid and soak your print for the recommended time Lay the glass flat or at an angle in a dish of water, and slide the print on it, emulsion against the glass Remove the glass and print from the dish Use a squeegee to make good contact overall

Drying RC prints

A special print-sized wiper blade can be used to remove excess water from RC prints, to further reduce the already short drying time that these need

Left to air dry in a warm room, RC prints should be dry in about 15 minutes. This can be reduced by using a fan heater or dryer held at a safe distance

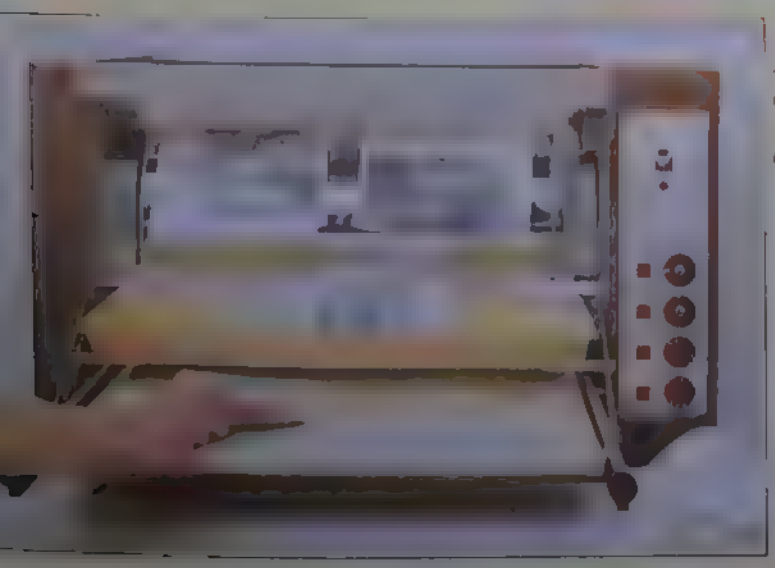
Lay the gl[illegible] print on top of th[illegible] and put [illegible]wo sheets of ph[illegible] [illegible]tting paper on the back of the print [illegible] down, just the c[illegible] it for at least a day—two if [illegible]nd then peel off the bl[illegible] print does not lift away from [illegible]

[illegible] can be used to dry [illegible] prints regardless of their [illegible] Simply wipe the excess water [illegible] ur print and place it on [illegible] without glazing solutions with the emulsion towards the blanket and the back towards the drum or heated surface Check it every few minutes if you are using a flatbed machine and it will soon be dry Never put RC paper [illegible] a glazer for drying unless [illegible] temperature is well below 90 °C, otherwise the coating will melt

Print curl

Sometimes fibre based prints can curl in drying This can be cured by drawing the print backwards over a table edge with the emulsion up The angle between the paper and the edge, and the pressure applied, determines by how much the curl is reduced Take care not to bend it too far back or the emulsion may be torn or cracked

If your fibre based prints are dried in air, and have wavy edges as a result, then damp the edges on the back of the print until they begin to go soft Hold some photographic blotting paper in front of a fire until it is dry and almost scorching, then lay it on the back of the dampened print and sandwich the two between flat surfaces, like thick sheets of cardboard Apply gentle but firm pressure until the print has dried Another method is to put your prints into a warm dry mounting machine under pressure for a few moments then release Repeat until the print is flat



Roger Payling

Heat drying *A glazing machine can be used to dry and to glaze fibre based prints, and [illegible]at lower temperatures—to dry RC prints*

Curing curl *Fibre based prints which curl during drying can be straightened by drawing the print across a straight edge*

Old rollfilm cameras

The modern rollfilm camera evolved through a series of outstanding designs, some of which have never been bettered. Many of these classic cameras are not only prized collectors' items but also eminently usable

A photographs by Colin Hunter

Pre-1895 rollfilm cameras

[illegible]

rollfilm. In itself the box camera [illegible] wide field but enthusiasts [illegible] specialize. The only much [illegible] boxes are those dating back before [illegible]

Rollfilm cameras from 1933 to 1939 *These black enamel and nickel finished items were made by Kodak, Zeiss and Heidecke. Today, only the Bantam and the Rolleicord are collectors' items*

Vanity Kodaks, *were made in a wide range of colours, which made these models extremely popular. In conception, they are similar to the Vest Pocket Kodaks*

Rollfilm cameras are probably the most collectable of camera types. They were often in the forefront of innovation long before the advent of the 35 mm format and at a time when the popularity of plate cameras was waning. Even during the 1950s, when 35 mm began to be established, rollfilm cameras retained sufficient adherents, both among users and manufacturers, to ensure a continuing flow of new, or at least revamped models. Since then, the emphasis has been mainly on refining existing designs to suit the exacting requirements of professional users: the Hasselblad 2000FC/M, for example, is a vastly improved descendant of the original Hasselblad 1600F of 1948.

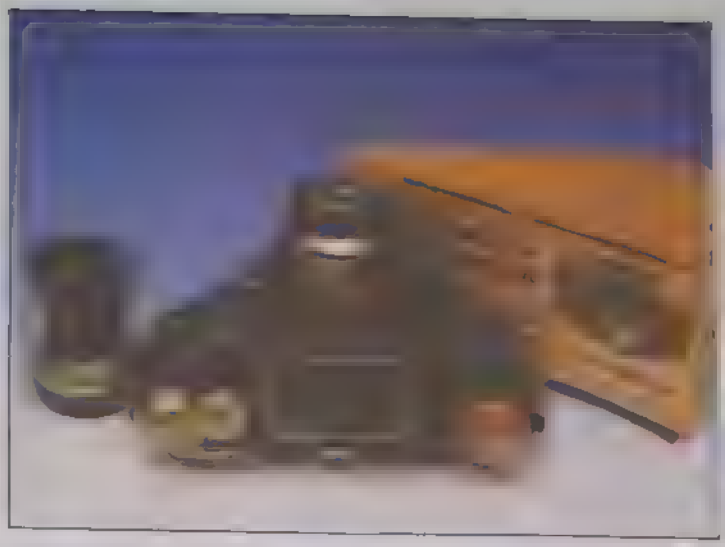
The number of variations of rollfilm cameras is so large that there can be no definitive categorization. Historically,

Cameras courtesy of Malcolm Glanfield

Rollfilm folders

Effectively [illegible]

[illegible] Kodaks [illegible] many of which [illegible] be used [illegible] Speed Kodak [illegible] by the [illegible] Kodak patents was the [illegible] development [illegible] rollfilm [illegible] Most [illegible] the late 1920 were [illegible] Zeiss and the [illegible] man manufacturer [illegible]



[illegible] Scarcely larger than the [illegible]

[illegible] Zeiss [illegible] below left and **Welta Perfekta**

Wooden bodied *This beautiful Lizars camera (from about 1905) hailed from Scotland. Using 120 film, it could be fitted with lenses varying from a Rapid Rectilinear to a Zeiss Tessar*

[illegible] in a Compur shutter (1 [illegible] coupled rangefinder (d [illegible] a 57 × 83 mm format giving eight frame on a 120 roll Th [illegible] ms c [illegible] could to [illegible] ently and [illegible] e care the [illegible]

Quality results *can be obtained with these postwar folders. They are (from left to right) the Zeiss Ikonta, Kodak 66 and the larger Ensign Solfix 820*

The postwar Super Ikonta *(left) has an f/2.8 Tessar lens. 'Made in occupied Japan' is the legend on the back of the Mamiya 66 (right)*

Voigtländer are four of the best. Another guide is a good shutter. Compur for preference, or Prontor. The general quality of finish is also a good guide, as is the rigidity of the front standard.

There are [illegible]

Reflex cameras

The [illegible]

Camera courtesy of Paul Henry van Hasbroeck

The 1950 Hasselblad 1000F *is an improved model of the original 1948 1600F. It can be used with current film magazines, Polaroid backs and interchangeable viewfinders*

cameras in the rollfilm folder category. They include the Super Ikontas, the 1938 Voigtländer Prominent (complete with coupled rangefinder *and* built-in extinction-type exposure meter) and Kodak Six-20—the first camera with automatically controlled exposure via a photoelectric cell. Generally, the prices of these cameras reflect their worth as picture-taking instruments rather than as antiques.

Rolleiflex. The first [illegible] defunct 117 six-exposure [illegible] all have since been m[illegible] 620. The original [illegible] collectable, with [illegible] window frame countin[illegible] shutter cocking. Later m[illegible] the 1932 (crank wind) and [illegible] shutter cocking) types [illegible] reasonably popular, but [illegible] ingly valuable. The same is tr[illegible] original (1933) metal plated Roll[illegible] with its odd art deco pattern. Of the [illegible] models, the Rollei-Wide (with 55 mm lenses) and Tele-Rollei (with 135 mm lenses) command high prices as much

collectable TLR design

Reliable twin lens reflexes *The 4 × 4 cm grey finished Baby Rolleiflex (left) and Yashica 44 of the 1950s and 1960s have not retained their popularity, despite their compact dimensions and first class lenses Nevertheless, these cameras are well worth collecting both for their immediate usability and for their potential value in the future*

A wide variety

The 1950s French Lumière, *more a super box than a twin lens reflex, has an ingenious built-in extinction exposure meter and a speeded shutter*

All photographs by Colin Glanfield

Assignment

Californian zoo

[illegible] can easily lead to [illegible] photographs, but with a little more [illegible] and imaginative

Lion *When photographing animals in the shade with slow film Sergio waited until the subject was still so a slow shutter speed did not cause blur*

Grizzly bear *For this portrait of a bear Sergio was careful to make sure that both the eyes and the full length of the muzzle were held in focus*

Elephant tail *This shot is typical of the way Sergio concentrated on small details to show features*

Zebra *Backlighting and light reflected from a nearby white wall gave a pleasant soft glow to this shot 300 mm lens supported on a monopod*

Koala *For shy creatures like this koala Sergio had to wait a long time for the shot he wanted Even then he still needed his 300 mm lens for a close view*

Damage

Camera head

Polar bear

What went wrong?

Children

Children are generally vivacious, unselfconscious subjects and can provide excellent material for candid shots. But good material does not **guarantee good results, as Sally Greenhill points out**

Despite the strong, almost full filling of the frame with the subject the brightly lit yellow filing trays in the left hand background distract the eye from the subject—something that could have been avoided with only a slight change of viewpoint. Once it becomes second nature to take notice of backgrounds it is simple to prevent fundamental errors spoiling your shots. Here, I would have moved slightly to the left and asked the subjects to turn a little to face me—in one move this would have eliminated the trays and got a little more light on the faces—judging by the light on the girl's face and arm, there is a window somewhere over to the left. The giant bottle of water looks, at first sight, like a large, green fish, so if the girl had straightened her arms, the bottle and the two heads would have been more nearly on the same plane of focus, making the bottle more defined and recognizable

In common with the other two pictures, this shot, despite its candid, informal atmosphere, suffers from a confused background. The main subjects, the heads and the cake, have not been composed powerfully enough to compete with the clutter of the plates and mirrors on the wall behind, especially as the heads are almost the same size and shape as the plates. I think the best solution would have been for the photographer to move close up to the wall so that the open room formed the background. This would have given a dark, out of focus background to set the subjects against

Also, the lampshade steals the limelight while the cake is very much in the shade—light from the lamp could have been used to cast highlights on to the cake and faces to restore their importance in the picture. A touch of flash, bounced off the wall would have improved the shot too, without destroying its pleasant atmosphere

Pictures of children playing, unless they are close-ups, are almost always more successful in an open situation or against a plain background. Possibly, the photographer could have organized the children so that one or other of the two walls in the picture formed the whole background. Either the white wall on the left, or the brick wall of the house on the right, would have been better than the mixture of the two, with the sharp dividing line falling just behind the main subject.

I would have taken the children to a park where less complicated backgrounds would not interfere with the subjects activity. Make sure that you don't underexpose the pictures though. It's all too easy, especially with automatic cameras, to end up with a white sky, dark grass and your subjects too dull

In a more open situation it would be possible to experiment with the light coming from different angles by moving around the subject. Semi backlighting, with the shadows running towards the camera, can often give the most dramatic lighting for this kind of subject, where the overall shape and the movement are more important than the clarity of each face

Grain and contrast

Photographic materials and techniques are usually aimed at producing sharp evenly lit images but sometimes you can evoke more atmosphere and create more impact by emphasizing grain and aiming for extremes of contrast

The [illegible] are suitable for a parti[illegible] is best to take pictures [illegible] the most appropriate materials Then not only are you technically prepared, you are also mentally geared up to seeing each scene as it will appear in the final picture, often radically changed

The difference between black and white and colour is much more marked when you are trying for these effects A low contrast, grainy image may look dreamlike and romantic in colour, but merely flat and boring in black and white And a high contrast black and white image can appear striking, while in colour the strong hues may appear garish and disconcerting

Some of the most appealing and easily produced results are those which are very grainy In black and white this is easy enough to achieve by using a very fast film with almost any subject However, when contrast is greatly increased, such as by using lith film (see page 914), you will have to select subjects more carefully Similarly, if you were planning to make very large

Landscape *Pin sharp resolution of detail is not always essential for landscape work—here fast film gave a grainy effect while the contrast of the light separated the foreground from the background.* **Seed pods** *An exaggerated grainy effect can also be created by using texture screens during the duplicating process*

[illegible]

[illegible]

[illegible] of these [illegible] expressing the [illegible] equivalent of graininess. It can [illegible] emphasize drama since it tends to shadow over [illegible] detail. Smooth tonal variations are transformed into harder, sudden changes from white to dark, and details are obscured. Your attention becomes focused on shapes and masses — like the shape of a tree rather than its constituent leaves and branches or the massiveness of a factory, rather than its windows.

While graininess is most commonly used for high contrast subjects, it can be used with low contrast scenes as well, such as misty views, particularly if you take great care to keep not only the image but the individual grains sharp

Field patterns *Striking graphic effects can be produced by isolating a few contrasting patches of landscape—like these sections of fields*

Solitary house *The grain of fast black and white film is ideal for conveying the bleakness in scenes like this. Hard paper brought out all the subtle contrast variations*

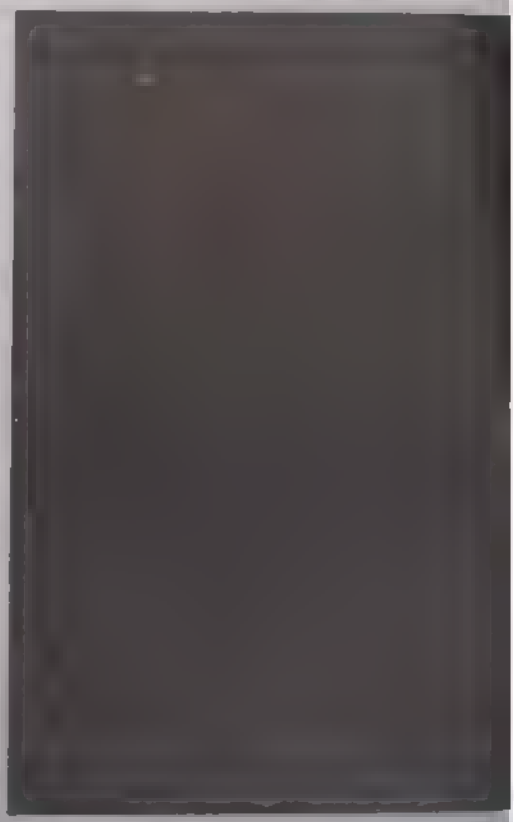
Dancer *Deliberately opting for a minimum of contrast also suits certain subjects—especially when trying to establish a soft, romantic mood*

Window shutter *Extreme grain can be achieved by enlarging a small portion of the original 35 mm slide on to 5 × 4 in. film*

Then ea [illegible] dot and [illegible] very well in this way—it would seem as if you were looking at the smoke and dust [illegible]

[illegible] have natu[illegible] The result is un[illegible] the grain t[illegible] ance as you can see [illegible] consist[illegible] insubstant[illegible] w[illegible] them [illegible] example [illegible] appear [illegible] so [illegible] Do this by photograph[illegible] on grain 5 mm against a [illegible] on an overcast day. Make sure that [illegible] is very little difference in brightness [illegible] the scene. Dress the subject [illegible] coloured clothes with [illegible] difference in tone between them and [illegible] background. Then make a light [illegible] print so that there are no [illegible] the background at all. Some [illegible] may be needed to get the right effect

Industrial scene *Black and white film is well suited to recording such extremes—here the brooding, ominous sky contrasts with the building.*



[illegible] rent appear[illegible] are on uprated film as the dyed grains themselves become [illegible]ble. The effect is [illegible] like the *pointilliste* technique of Impressionist painting which sought to reproduce colours in an additive way by using dots of different colours. In the case of a photograph, the grains are cyan, magenta and yellow.

[illegible] paintwork [illegible] become submerged in the [illegible] the colour of a slightly faded art[illegible] exaggerated.

The [illegible] images produced by these techniques [illegible] wide variety of subjects [illegible] has potential. What the effects all have in common is that the results are no longer representations of the subject—they have turned into images. The viewer cannot ignore the fact that they are images, made of dyes on film or paper and are not made to look like faithful [illegible] David [illegible] these soft [illegible] But there is a c[illegible] betwee[illegible] foc[illegible] methods (see pag[illegible] tends to give rath[illegible] low contrast grai[illegible]

Banana *Even in the studio, deliberate exaggeration of grain can produce striking results, and is effective especially with bold shapes and strong colours*

Cityscapes *Here, dramatic contrast has been used to make the bright, sunlit office block stand out strongly from the dark shadowed foreground*

Bridge *The grainy appearance of high speed colour transparency film has been exploited to underline the gloominess of this wet, foggy scene*

Darkroom

Etch-bleach prints

Simpler than some forms of toning but as colourful as any, this process enables you to convert ordinary black and white film or print originals into spectacularly effective images

The *etch-bleach dye* pr[illegible] cheap and exciting way of making [illegible] coloured photographs from black [illegible] white originals. Although primarily used for colouring RC prints, the process [illegible] originally designed for films and plates and can also be used for these.

The chemicals and dyes required in addition to ordinary darkroom materials are cheap and readily available.

Etch-bleach is a reversal process in which exposed areas are removed from the supporting paper base or film base in a chemical bath. The bath reacts only with gelatin containing the silver of the exposed areas and only the gelatin in these areas is lifted from the base. Unexposed parts of the print or film remain unaffected. The gelatin [illegible] in the unexposed areas [illegible] give a colour contrast with the [illegible] of the film or paper base [illegible] negative image of the or[illegible].

The original image

Because the process involves the complete removal of the gelatin emulsion layer in exposed areas, it is best to work on very high contrast line film or prints. Bold but simple designs and images work best. These can be obtained from continuous tone originals by making enlargements or contact copies on lith film (see pages 914 to 917)

Etching [illegible] produce a [illegible] larly well [illegible]

[illegible]

Etch-bleaching

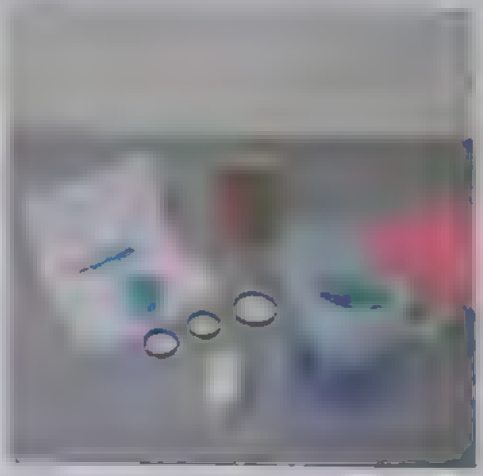
There are several [illegible] preparing the [illegible] Kodak EB [illegible] better results are obtained [illegible] by using one of the two alternative formulae. Try using the EB [illegible] rather temperature than recommended for films, say 40°C–45°C. The etch-bleach solution can sometimes be bought by special order from [illegible] shops but it is a easy matter to prepare your own. The chemicals [illegible] readily available and could be weighed out precisely by your [illegible] pharmacist.

Shortly before the etch-bleach solution is required, mix equal parts of solutions A and B. For solution B [illegible] hydrogen peroxide in [illegible] strength—it [illegible] strength. Solution B should [illegible] a brown screw-top bottle in a [illegible] away from bright light. The mixed etch-bleach solution has an active [illegible] days. Wear a[illegible] mixing and [illegible] each solution to avoid skin irritation.

Start the etch-bleach sequence by soaking the print—give it a full [illegible] you feel the original wash may have [illegible] skimped at all. Then transfer the print to a dish of etch-bleach solution [illegible] 24°C, agitating continuously for three minutes, or until the image has completely dissolved. Stubborn parts [illegible] emulsion can be removed by [illegible] rubbing with a cottonwool swab [illegible] sponge. The remaining emulsion [illegible] easily scratched in this wet state [illegible]

Etch–bleach processing

1 *In addition to the utensils here, you will need etch–bleach chemicals, developer, suitable dyes and storage bottles for prepared solutions*



2 *Start by mixing up the etch–bleach solution. Ask your pharmacist to weigh up the amounts you need if you cannot do this yourself. (Formula 4 was used here)*

3 *Before use add an equal quantity of hydrogen peroxide to the etch-bleach solution. Immerse the washed print in this for several minutes*

4 *Depending on the strength of the solution and its temperature, several minutes may pass before emulsion removal occurs. Then wash the print*

5 *Transfer the print back to the dish of etch–bleach solution for complete removal of the emulsion. Carefully swab clear areas of fine detail which do not float free*

6 *Now wash the print thoroughly, ideally in running water, alternatively use several complete changes of water until the rinse water runs clean*

7 *You can now redevelop the image to introduce a type of Mackie line effect in areas not completely bleached, or to encourage bleaching in a repeat run*

8 *After washing the bleached print, (and after redevelopment), transfer it to the dye bath you are using. Make sure powder dyes are mixed properly*

9 *Then carefully rinse the dyed print to clear the highlights. As some dye is washed out, slightly over-dye the print when dyeing*

Tessa Musgrave

Colour paper base *The unusual effect of using a positive original print made on coloured fibre-based paper, subsequently etch–bleached to give a negative image Although chemicals work best on RC papers, fibre-based materials can be tried and can be successful*

Etch-bleach-redevelop-dye process *The process works best on line originals but can work with continuous tone images (such as lower left) which are redeveloped (centre left) and dyed (righthand pair)*

careful not to pick at areas of fine detail which you wish to retain

Etch-bleach solution is capable of dissolving any gelatin which contains metallic silver If there is insufficient silver in the depth of the emulsion the gelatin here will not dissolve—hence the importance of giving ample exposure

If the image fails to bleach completely the hydrogen peroxide may be too weak or exhausted Make sure you use fresh solution

When all the black image area has

Dyeing prints

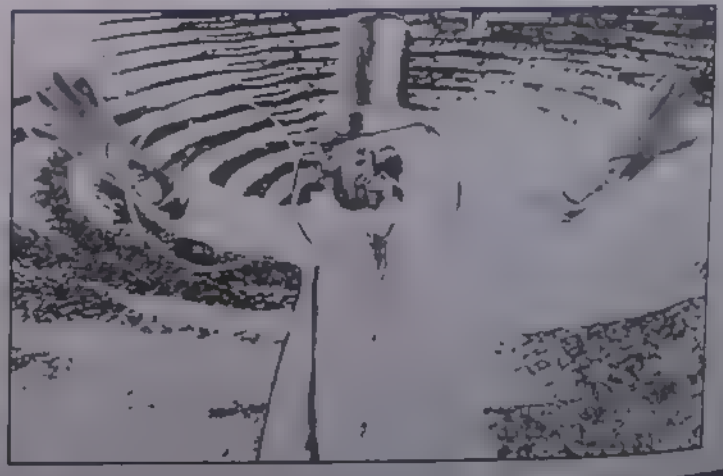
[illegible]

form and sh[illegible] strength Add a few [illegible] agent to promote [illegible] more colours may be [illegible] further colours Wear [illegible] almost indelible [illegible] protect both yourself and [illegible] surfaces from splashes

Apply the dye using a [illegible] cotton wool Saturate the [illegible] of the print to avoid a blotchy appearance If you prefer make up a [illegible] dye and immerse the print in the until the colour is slightly darker than you want Agitate the print continuously

Transfer the dyed print to a washing [illegible] of running water and leave it in this until the last of the surplus dye is removed and the wash water runs clear Only the unbleached areas will accept dye and you may find with some types of dye that it is better to remove surplus dye with a cottonwool swab rather than risk staining Simply lay the dyed print on a sheet of newsprint and gently wipe the surface of the print to clean the highlight parts of the image Then dry the print

Slight veiling of the highlights may be removed by carefully swabbing the affected areas with ordinary domestic bleach followed by a two minute wash But the cause of veiling is often inadequate print density of the original image—residue gelatin will of course absorb dye If the problem persists try using a harder grade of paper and more concentrated developer



Etch bleach formulae

Solution A

1000 ml 1000 ml

Solution B hydrogen peroxide (20 vols to 40 vols and 10 vols may be tried)

Mix equal parts solution A and B. Solution tempe[illegible]e above [illegible] but heat solution indirectly using a waterbath. Abou[illegible] sufficient for a number of prints

Selective treatment

By using art masking fluid, tape or film it is possible to bleach and to dye on a selective basis. This makes it possible to include parts of an original black image and as many dye colours as wanted.

Selective etch-bleaching is best done by dipping just parts of the print in to the solution, or by localized swabbing, but for extensive and intricate work it is more convenient to apply liquid masking to the dried print beforehand.

To selectively dye a print, apply masking after the etch-bleach stage either before or after the first dye has been applied, depending on how you are working. When laying down many different colours, always start with the darkest and progress to the lightest so the effects of spillage are rendered less noticeably. When the first dye has been applied, leave the print to dry before applying the mask. Then dye the print with the second colour and leave it to dry.

Alternatively, you may prefer to completely mask the etch-bleached image and gradually remove parts of the mask as each dye colour is applied. Use a swab well saturated with dye to do this, keeping it moving at all times to prevent blotchiness.

Film mask material is useful for blanking off large areas, and can be cut to precise shapes with careful use of a scalpel. Liquid masking fluid can be painted on and is more suitable for intricate shapes and small details. This is easier to spread when mixed or shaken well. Use plastic applicators rather than brushes as they are easier to clean and cover more evenly. Make sure all areas not to be dyed are covered well. As the dye will seep through the smallest hole in the mask, give two coats to seal it.

Etch-bleaching film

The etch-bleach dye process can be applied to any high contrast process film—lith film is ideal, since no intermediate tone elimination stage is necessary to get an image consisting of solid black on a clear background. If you want to treat parts of the image selectively, a large size copy makes work easier. This can later be copied, on normal slide film, to give an image suitable for projection. Etch-bleach dyed slides can be combined in sandwiches for special effects.

If you have an existing black and white lith negative, etch-bleach this in the normal way. For dyeing the remaining emulsion use dyes intended for photographic use, such as those supplied in the Photocolour kit. Mix a few drops of your chosen colour with enough water to cover the film. Use a saucer, Petri dish or shallow tray large enough for the film sheet or roll that you are dyeing. Immerse your film in this colour bath for two or three minutes, agitating continuously. Then wash the film to clear the highlights of dye, and leave it to dry.

Multiple colours *By using paint-on mask fluid, parts of the image can be protected from either bleaching (to leave black) or application of a particular dye, enabling two or more colours to be applied*

The result is a coloured positive transparency—presuming you started with a negative image—which is block dyed in the chosen colour.

The etch-bleach process can be applied to unprocessed film as well. Develop this for at least the normal time, remembering that a dense image is essential. Then wash the film thoroughly. Transfer it to a deep enough bath of etch-bleach solution (use the Kodak formula), agitating continuously for four or five minutes. Briefly rinse the film and then transfer it to a white bowl containing water. Now fog the film to white light using a photoflood bulb or similar lamp placed one metre or less above the bowl.

Redevelop the film so that the fogged remaining areas of the film go black, and then complete fixing and washing as normal. You will now have completed a reversal process which is very handy for high contrast black and white slides.

Understanding...

B&W printing papers

Black and white printing papers have come a long way since the days of gaslight papers, and modern print emulsions are fast, easy to use and give a neutral monochrome image and a range of alternative contrasts

Print colours *The upper print was made on printing out paper, which gave the sepia image so often emulated today, while the lower was made in 1903 on Vicol paper, with a blue black colour*

Emulsion types

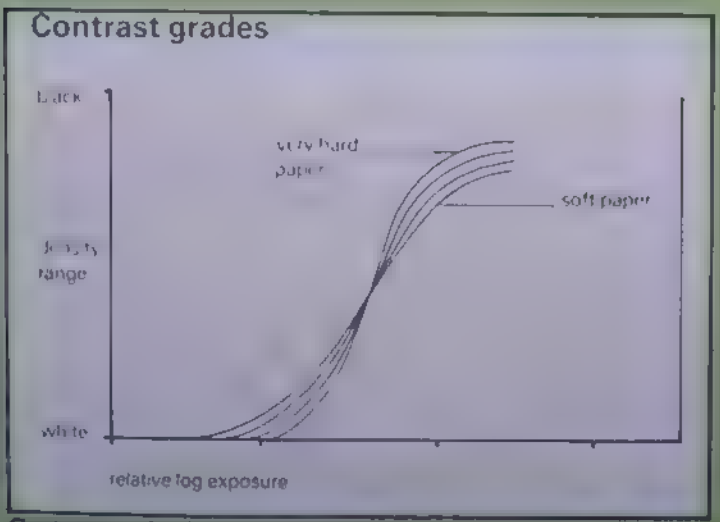
Nearly all print emulsions contain either silver bromide or silver chloride or a mixture of the two, although some may contain a small quantity of other silver halides, such as silver iodide. Silver chloride and silver bromide emulsions differ in two main qualities: sensitivity and the colour of the image.

Sensitivity Of the two principal halides, silver bromide is much the more sensitive. In terms of paper speed (now often measured to the ANSI (American National Standards Institute) scale) bromide papers can be 50 times as fast as chloride papers.

In the early days of photography, when negatives were fairly large, most prints could be made by contact printing and the low sensitivity of chloride was quite adequate. Indeed chloride papers, often known as *contact* papers—were ideal, because they were only affected by very strong light and could therefore be handled in bright yellow safe lighting or even by gaslight. Exposures were made by burning a short magnesium ribbon about half a metre from the printing frame.

However, with the arrival of small format negatives, enlargement became necessary and the greater sensitivity of bromide was needed. Contact papers fell out of favour for amateur use and are now used for a few special purposes and for copying documents. Nevertheless chloride is still used in conjunction with bromide in chlorobromide papers. Slow chlorobromide papers contain a large proportion of silver chloride, while fast

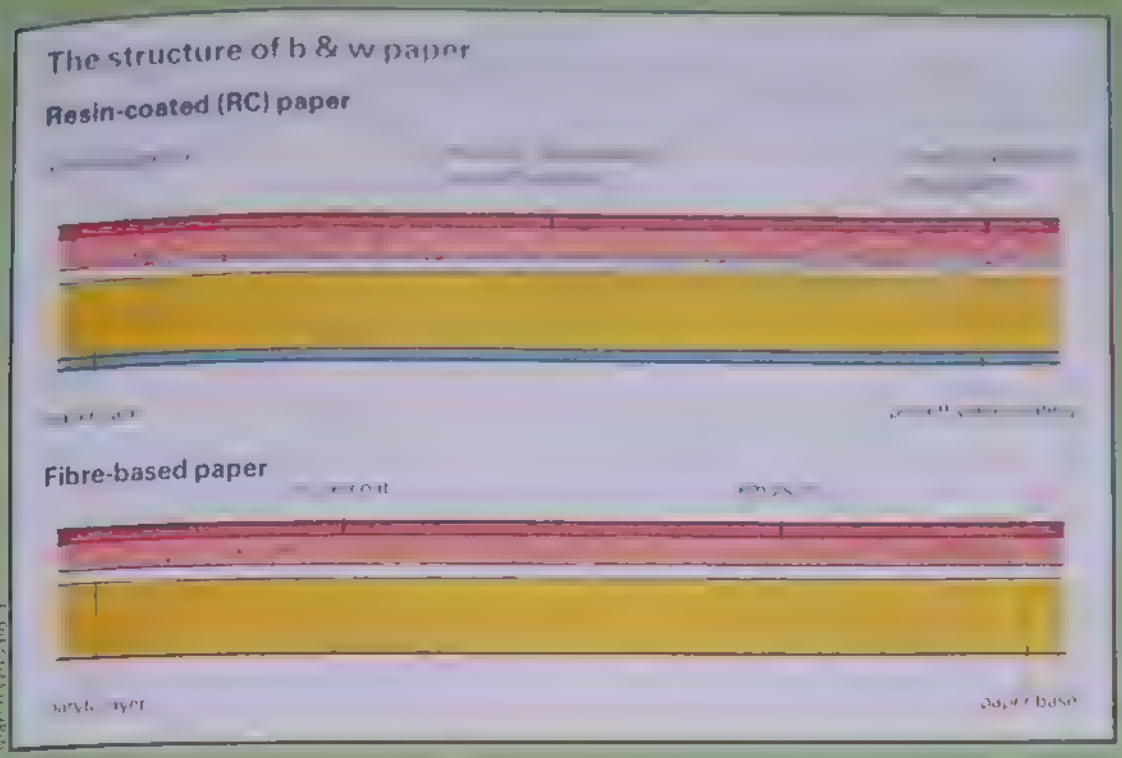
[illegible]



Contrast grades *The slope of the characteristic curve is different for each grade of paper. Soft (low contrast) paper needs a wide range of exposures to give its full tonal range and has a shallow curve, for hard paper, it is much steeper*

[illegible]

Image colour [illegible]



Structure *In fibre papers, the [illegible] sulphate to make it as white as possible. This layer is known, misleadingly, as the 'baryta' [illegible] name for barium hydroxide. In RC paper, the whiteness comes from a layer of titanium oxide [illegible] Unfortunately on exposure to light this layer gives off a form of oxygen that slowly attacks the polyethylene which eventually cracks. On both papers, a gelatin supercoat prevents stress marks*

grain size with any type of paper is very small and there is no such thing as a grainy print image—if a print looks grainy it is simply because the negative was grainy. Indeed, the grain can be so fine that grain size can be near to the wavelength of light and this produces a selective light scattering effect. Blue light in particular is lost. So if the image contains a high proportion of very fine grains, some of the blueness is lost and the image comes out not black but brown or even red.

Grain size depends partly upon the emulsion type and partly upon development. Bromide papers are relatively coarse grained and so give very good black images. Chloride, on the other hand, is fine grained and in pure form gives a very warm, brown image. However, manufacturers nearly always tended to add an organic *bluing agent* to chloride emulsions to yield a more acceptable neutral black image.

Chlorobromide papers give an image colour somewhere between bromide and chloride. However, the tone depends very much on the way the image is developed. In a high energy developer the image is almost black. Developed slowly in a weak solution containing a high proportion of potassium bromide restrainer, however, slow chlorobromide paper can give a rich, warm brown or even red image. Unfortunately, slow development also means a loss of speed and contrast and slow chlorobromide papers have almost disappeared—particularly since you can achieve an equally warm tone without loss of contrast by speed or by silver toning.

Contrast range

Contrast differences for papers used to be achieved by varying development, although much less variation can be achieved with papers than with films. But once high contrast roll films were introduced, this technique proved to be inadequate. Now manufacturers produce most papers in several numbered contrast grades ranging from extra soft (0) to extra hard (5)—though only glossy paper is available in all six grades.

The different grades have a similar tonal range and give the same maximum blacks and whites: the difference occurs in the exposure levels needed to give these tones. A soft paper will give a slightly grey de[illegible] exposure [illegible] considerable [illegible] even [illegible] great deal more to [illegible] maximum black.

The difference can be seen most clearly on the characteristic curves for the papers. The curve for hard paper, with its minimum exposure range, has a very steep slope; the curve for soft paper, needing a wide range of exposures to give its full tonal range, is much shallower. But both curves start and finish at the same densities.

Because of the need to stock five or six paper grades to cope with every possible negative, Ilford introduced their *Multigrade* paper which includes emulsions giving several different contrast grades on the same sheet. Each emulsion grade is sensitized to a different coloured light and so is 'activated' by printing through an appropriately coloured filter (page 535).

Rocky coast *One of the great attractions of slow chlorobromide emulsions was the warm brown image they gave if developed slowly*

Documenting The Depression

The work of the FSA photographers during America's grim Depression years set the standard for not only American documentary photography but for the world too

In the whole history of photography there has been no government sponsored group of photographers who have produced such an important and influential body of work as the FSA photographers Travelling through the United States in the late 1930s and early 40s they documented the effects of the depression years on the small farmers of Middle America. And through these powerful and uncompromising images, they helped to shape American society and publicize the fate of its more unfortunate members

The ranks of this group included such notable photographers as Dorothea Lange, Walker Evans and Arthur Rothstein—people whose work is among the cornerstones of documentary photo graphy and whose influence extends to all areas of photography even now

The FSA itself, more properly known as the Farm Security Administration, was an organisation set up as part of President Franklin Roosevelt's 'New Deal' in the 1930s This was a campaign thought up by Roosevelt's government to try and counter the catastrophic economic depression that had hit the United States after the disastrous 1929 Wall Street Crash

By the time Roosevelt came to power in 1933 the nation's economy was on the verge of collapse. Two-thirds of the banks had been forced to close, wages were down by an average of 60 per cent and one in three workers were unemployed

The effect on tenant farmers and sharecroppers was particularly disastrous Prices for their produce were so low that corn was left to rot in the fields—it was not even worth harvesting At the same time, landlords and finance companies continued to press for rent money and the repayment of loans Squeezed from both sides, many small-scale farmers were forced to give up their land and join the swelling ranks of migrant workers, shuffling from state to state, ready to do any job for a pittance The government suddenly found that agriculture—its biggest and most vital industry—was in danger of disintegrating

Obviously something had to be done. Moreover, it had to be seen to be done In 1935 the Resettlement Administration (renamed the Farm Security Administration in 1937) was created to provide a safety net for small farmers by offering low interest loans help with land reclamation schemes and aid for migrant workers Head of the Administration was Rexford Tugwell, a former professor at Columbia University One of Tugwell's first acts was to appoint a fellow Columbian academic, Roy Stryker, as chief of the Historical Unit

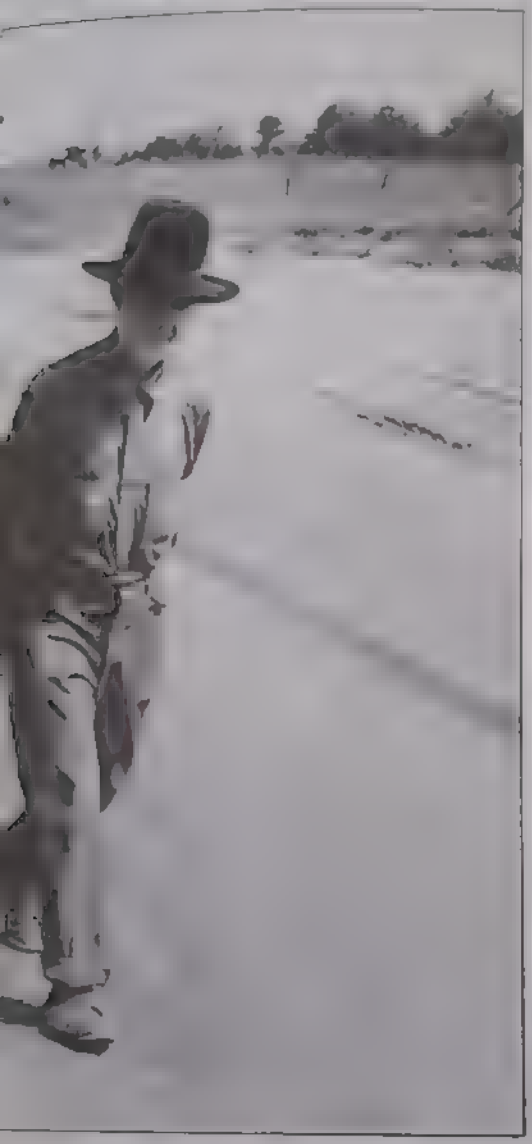
Some years previously, in 1925, Tugwell and Stryker had collaborated on a book called *American Economic Thoughts*—the first major economic textbook to use photographs extensively as part of its message Many of the pictures Stryker commissioned for the book had been taken by Lewis Hine, and Hine's work had given Stryker an early insight into the persuasive power of documentary photography

Stryker was originally employed simply to make a history of the activities of the FSA Although not a photographer he was very interested in the medium and saw its documentary potential. He had also seen Margaret Bourke-White's story on the Dust Bowl, a huge area of Mid West farmland desolated by soil erosion which appeared in *Fortune* magazine in 1934 Stryker was equally impressed by the work of [illegible] Lange who was already [illegible]

On the road *Lange passed this young Oklahoma farming family trudging across the state in search of work with their entire possessions contained in two small trolleys. Many families like this were driven from their land when the effects of drought and over-mechanization turned the state into a dust bowl*

as a photographer [illegible] particularly for the [illegible] she and her h[illegible]

fearless use of good [illegible] be crucial to the FSA and he at once set about organizing a team of photographers who had the [illegible] and s[illegible] ability to do the job



His first recruit was Arthur Rothstein, then a chemistry graduate and also from Columbia University. Although strictly speaking an amateur photographer, Rothstein had already helped Tugwell and Stryker on an earlier project—a pictorial history of American agriculture. In any case, Stryker was ready to give a chance to anyone who equalled his enthusiasm for photography. Even the rankest amateur was allowed to shoot a test assignment. If the results were good, Stryker hired them. His concern was always for the power of the photograph rather than the status of the photographer.

Not that the FSA lacked professionals. Stryker had been quick to draw into the organization Carl Mydans, a very experier[illegible]

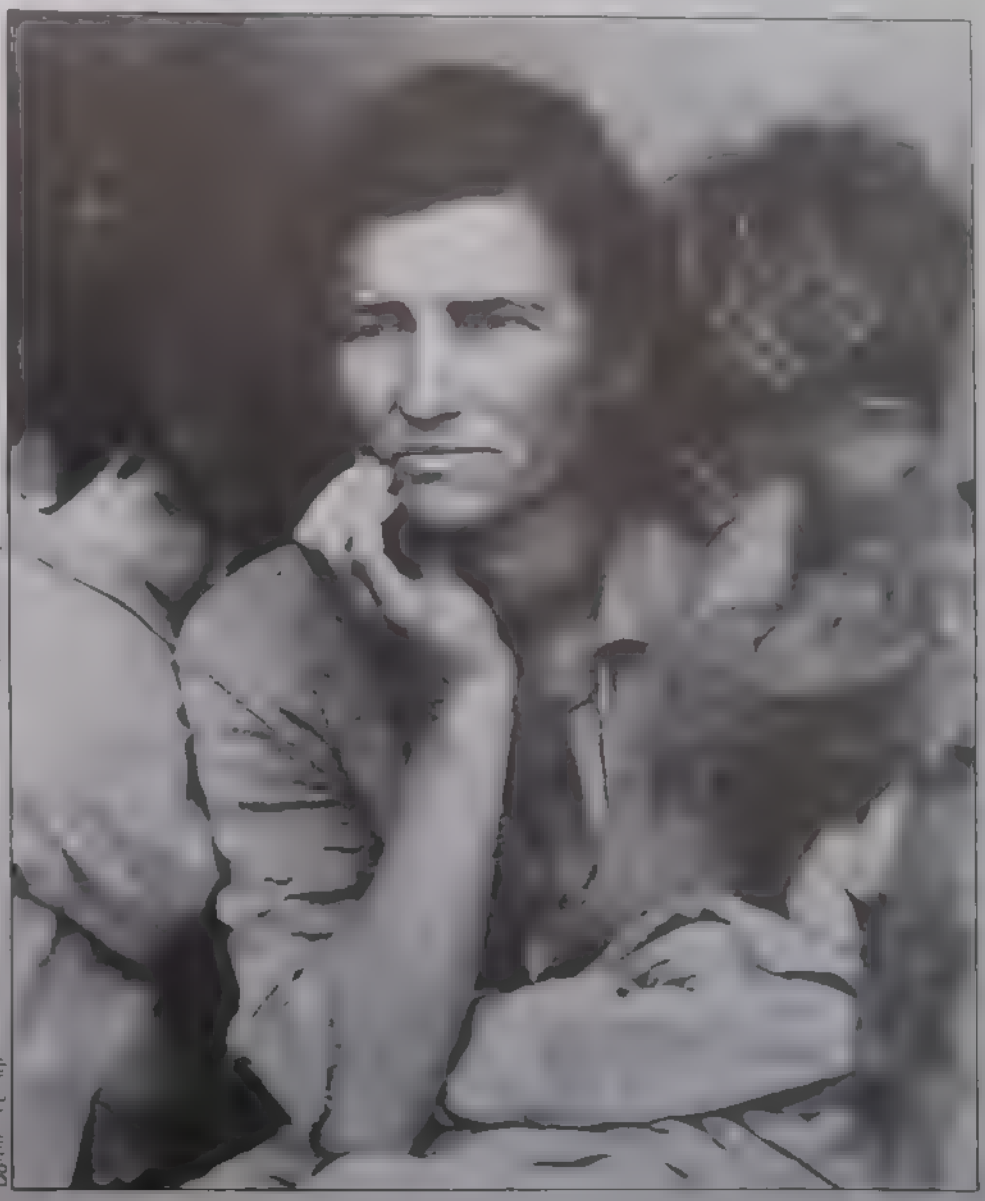
FSA also incluc[illegible] Vachon and the [illegible] period of time.

[illegible] extremely [illegible] was [illegible] Stryker [illegible] almost [illegible] itself was not a [illegible] their fundamental [illegible] photography.

Stryker believed that photography at least as far as the FSA was concerned [illegible]

FSA [illegible]

Migrant Mother, 1936 *Dorothea Lange's famous study of a young mother and her children is perhaps the most famous of all the FSA images. The family were camped out at a frozen-in pea-pickers' camp in Nipomo Valley, California and had been reduced to living on wild birds and the frozen vegetables from the fields*



Dorothea Lange

Russell Lee

Pie Town, New Mexico, c.1940 *Attracted to this town because of its name, Russell Lee soon found its community was also a good subject for his photography. He used his camera to record the relationships of a close-knit group of people working together to pull themselves out of the effects of the Depression*

graphers to use a [illegible] and desperately [illegible] use a Leica. He hoped to [illegible] work faster and turn more [illegible] and this was effective [illegible]

However, the [illegible] Evans left ultimately to work [illegible] magazine. Although he was [illegible] FSA for 18 months, Evans's [illegible] photography was considerable. Whatever recognizable photographic style the Historical Unit had was basically Evans' style—an austere clarity and technical precision that is still the hallmark of great documentary photography throughout the world.

Fortunately, not all Stryker's photographers had such a fraught working

relationship with him. Arthur Rot[illegible]

Dust Storm, 1936 *A farmer and his two small sons struggle against a dust storm in one of the worst affected drought areas in America—Cimarron County in the Oklahoma Panhandle*

Bud Fields and his family *One of a series of photographs of several sharecropper families which Evans took to illustrate James Agee's memorable book 'Let Us Now Praise Famous Men'*

and tenant far

Farmers, Missouri, 1936 *Carl Mydans' evocative portrait of poor farmers in Prairie City catches the mood of despair that swept rural communities in the late 1930s*

The Skull, 1936 *Rothstein's notorious picture. It aroused a storm of political controversy when it was used as a widely published symbol of the drought in 1937*

35 mm Kodachrome was first introduced in 1936, followed by a sheet film version in 1938. For some time its use in publications was restricted to advertising, fashion and generally more glamorous subjects. This was partly because of the high cost of reproduction and partly because of convention. It was difficult to place colour photographs with the type of magazines that would be interested in stories of rural poverty—most of them just could not print colour. However, both Stryker and his photographers were anxious to use the new films whenever it was appropriate. From the start they were well aware of the dangers of looking purely for 'colourful' subjects. Colour was to be used solely for its documentary value, where it would describe the realities of life more clearly than monochrome.

Some of the best FSA colour photography was taken by Russell Lee in 1940, while he was working on an assignment in Pie Town, Farmed in the Depression, this was a [illegible] community based on a combination of communal support and self-help—a sort of 20th century version of the frontier spirit that had forged the United States into a nation during the previous century.

Lee had joined the FSA in 1936 as a replacement for Carl Mydans and was to stay with the Administration until it ceased to function in 1943, making him its longest serving photographer. Although not as well known [illegible] Lee was in many ways the ideal photographer for the FSA. He was technically an excellent cameraman, deeply committed to the idea of social justice implicit in the New Deal and had a sympathetic nature that enabled him to quickly gain the trust and cooperation of the people he wished to photograph. He also had a precise understanding of what made the sort of strong, clear pictures that magazine editors wanted to use for best dramatic effect.

Not surprisingly, he and Stryker got on extremely well. Although Lee was out in the field for months at a time, Stryker frequently wrote him long and detailed letters about the type of pictures he was looking for at any particular moment. One shooting list alone contained nearly 100 separate subjects for Lee to photograph from 'Warehouses filled with food' [illegible]

[illegible] Stephen at the Museum of Modern Art, New York—*The Family of Man* and *The Bitter Years* [illegible]

The photography of the FSA [illegible] extraordinary influence on American society in the late [illegible]. As [illegible] has photography made [illegible] of its problems [illegible] calling for reform. The FSA [illegible] great and lasting influence [illegible] graphy itself. Several [illegible] graphers went on to work [illegible] magazines. [illegible] for *Life* Arthur Rothstein [illegible] Walker Evans [illegible] with *Fortune* where [illegible] shoot and [illegible] virtually [illegible] photographers [illegible] both the documentary [illegible] concern for human [illegible] characterized their work [illegible] and, from the broader [illegible] national press, were able to [illegible] new generation of photojournalists [illegible] these skills and attitudes.

Further proof of the quality of the FSA photographers' work can be [illegible] in the continuing demand for their pictures. Even today, [illegible] initial documentary relevance has gone, the Library of Congress still receives a constant flow of requests from magazines and book publishers to reproduce prints from the massive FSA file which contains over a quarter of a million negatives from this unique collection.

Wide view equipment

Compared with what the eye sees, most cameras fitted with a standard lens offer a very limited view of a scene. But there is a wide range of wide view equipment for seeing much more of the picture

Converters

Converters *are attached to the front of a prime camera lens via a series VII adapter, which screws into the filter ring. They perform best on lenses of focal lengths in the range 40 to 60 mm*

Super-wide angles *of view are achieved with fisheye lenses. But for general photography, the image produced by a full-frame fisheye (below left) is more practical than that of a circular image fisheye, which is more suitable for specialist or 'one-off' shots*

Dave King (by courtesy of Ryalots)

novelties poor d [illegible]
important factor
Some [illegible]
wide angle [illegible]
refle [illegible]
lens [illegible]
are of only [illegible]
photography [illegible]
the photographer and ca [illegible]
centre of each frame For a [illegible]
applications, [illegible]
but generally, su [illegible]
regarded a little n [illegible]

Wide angle lenses

The most common mean [illegible]
wide view is to fit a [illegible]

Ultrawide lenses—those with a focal length of 21 mm or shorter—are difficult to manufacture, particularly for SLR cameras A major factor is that the retrofocus lens design that provides sufficient clearance for the camera's swinging reflex mirror requires great precision As a result, these lenses are usually expensive, though it is possible to buy a 20 mm lens for about 25 per cent more than a comparable 24 mm

Generally, ultrawides are much like ordinary wide angle lenses, except for the wider angle, but the shorter focal length lenses tend to be much heavier bulkier and have enlarged front elements Typically, maximum apertures in the 17 to 20 mm range are about f/4, but wider lenses are usually limited to f/5 6

Perhaps the most distinguishing external feature of an ultrawide lens is the hood This has a deeply scalloped appearance, because regions of the hood are cut away where the angle of view is widest so that they do not appear in the corners of the frame When buying an ultrawide, check that a hood is supplied, or that a matched one is available as an extra, because at short focal lengths, a hood is essential for keeping stray light out of the lens.

Filters, too, are purpose-built Usually, they are built-in, mounted in a rotating turret This is not a luxury but rather an essential for good performance which would be impaired by unsuitable filters. In any event, the steeply convexed front element, which is a prominent feature of many of these lenses, makes the fitting of a conventional filter impossible. Although filter turrets offer only a limited range of colours, lens manufacturers can usually change one or more to a filter of the user's choice

True ultrawide lenses show no distortion of straight lines in the picture area, and this is a requirement that becomes more difficult to fulfil as focal length is reduced The practical limit, in terms of angle of view, is 120°. At 118°, the 13 mm Nikkor comes fairly close to this. True wide angles with an even wider angle of view are unlikely to be introduced in the future, because they are extremely expensive Today, many are available only on special order Even a large manufacturer is unlikely to sell more than 20 of any one model per year

Large and fast

[illegible]

A fisheye view
An astonishing 220 angle of view taken in by the 6 mm f [illegible] Nikkor fisheye Standing well behind the camera, the photographer can even see his own outstretched hands

Fisheye lenses

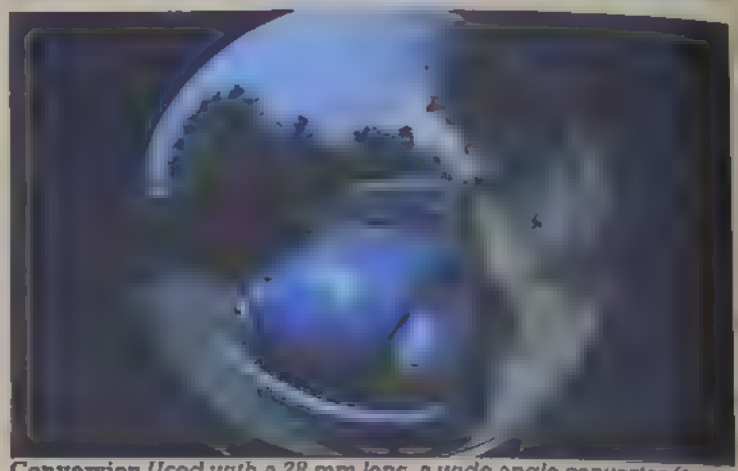
Still wider view [illegible]
fisheye [illegible]
[illegible]
straight lines [illegible]
outward [illegible]
uncorrected [illegible]
invaluable for [illegible]
view

Fisheye lenses were first [illegible]
practical applications [illegible]
marked contrast [illegible]
fashion pictures with [illegible]
associated The [illegible]
sky lens [illegible]
photographs of [illegible]
typical uses are for [illegible]
insides of boilers and pipes

As with any [illegible]
circular image [illegible]
image fills the frame [illegible]
produce an image [illegible]
mm wide at the centre [illegible]
frame fisheyes are of more practic[illegible]
to the creative photographer, b[illegible]
circular type cover [illegible]
view—up to 220°—a[illegible]
industrial and scientific applicati[illegible]
Invariably, both types have built [illegible]
filters, but focal length, maximu[illegible]
aperture, and other features differ widely between the vari[illegible]

A typical full-frame fish[illegible]
angle of view of 170°, a focal length [illegible]
mm, and a maximum aperture of f/3 [illegible]
circular image fisheyes, because they are designed for specific applications, tend to be more exotic A few have protruding rear elements, and must be used with the mirror locked up, but because they are often used on remote controlled, or unattended cameras, this hardly ever matters

The standard *The type of view taken in by the 'standard' wide angle lens—the 28 mm*



Conversion *Used with a 28 mm lens, a wide angle converter (top) and fisheye converter (above) give very wide views*

Focal lengths of circular image fisheyes range from 6 mm to about [illegible] mm and maximum apertures are small about f/5.6. Often, exceptionally short focal length models have no focusing helicoil, which is unnecessary because of the extreme depth of field. A 6 mm lens at full aperture, for example, records everything in focus from infinity to 1 cm from the lens surface.

Panoramic cameras

Designed exclusively to produce wide angle pictures, panoramic cameras can be grouped into three types. The most elementary type is simply an ordinary camera with a lens that covers an exceptionally wide angle of view. Several different models are produced. Most of them are based on a Schneider Super-Angulon lens, which has a focal length of 65 mm. Other manufacturers make lenses of the same focal length, but the Schneider is by far the commonest. The lens gives wide angle results on the 5 × 4 inch format, and is fitted with a leaf shutter and a conventional iris diaphragm. These [illegible] shutter speeds ranging from [illegible] to [illegible] seconds and apertures in the range f/5.6 to f/22.

The various wide angle cameras that utilize this lens generally consist simply of a cone to support the optics, a sheet film holder, matt glass for focusing and an optional optical viewfinder. A helicoid screw built into the lens serves as a focusing mount. Cameras using lenses of this focal length include the Plaubel Wide Angle, the Sinar Handy, the Globus Super Wide and the Cambo Wide Angle 650. Some of these, such as the Cambo, have a limited amount of rising front but, generally, the lens is fixed.

A less common version of this fixed lens–fixed-film system uses a 47 mm lens but this covers only the 6 × 9 cm format instead of the full 5 × 4 inch.

Although panoramic cameras utilize conventional formats, they produce pictures that are much wider than usual. The only camera to achieve such an outstanding performance with a fixed lens and film is the Linhof Technorama. This remarkable camera uses 120 rollfilm, and takes pictures measuring [illegible] × 66 mm, nearly three times as wide as the standard 6 × 6 cm format, and covering a horizontal angle of view of [illegible].

The camera has a [illegible] mm f/8 lens and takes four exposures on each [illegible] film. Because the rays of light reaching the corners of the frame travel [illegible] much farther than those at the centre, the lens on this camera exhibits severe vignetting. To compensate for this problem, a filter is supplied with the camera. This has a neutral density spot at the centre surrounded by clear glass. The filter serves to even out the exposure across the width of the frame. For its type, the Technorama is unique in its angular coverage, but its 90 mm lens can be used on any 25 × 20 cm (10 × 8 inch) format camera, and the resulting pictures cropped down to the same panoramic format.

Fixed-lens–fixed-film cameras are costly, mainly because of the exotic lenses they require, but they have considerable advantages over other types of panoramic cameras. They are virtually free from distortion, but

spherical objects in the corners of the frame appear oval due to the extreme angle of view (see page 339). When correct rendering of buildings and architectural features is important then this type of camera is the best cho

Another advantage is that it can be used in low-light because the shutter can be exposures. This is not usually p with other types of panoramic in which the lens or the entire camera moves during exposure.

A moving lens

The second way to produce a panoramic picture is to make the lens swivel quickly during the exposure. In this way, the lens need not have a very wide field of view but the image is scanned across a wide area of film. Previously, many models utilized this principle though fewer have been made recently—the Widelux F7 and the Panon are examples. The Widelux F7 is fitted with a 26 mm *f*/2.8 fixed-focus lens, which revolves inside a narrow drum. The rear of the drum passes in front of the film, and incorporates a vertical slit which serves as a focal plane shutter.

The 35 mm film runs around half of the circumference of the drum along a curved path. The camera exposes film across only about two-thirds of this curved portion but, nevertheless, produces a picture that takes in an angle of view of 132° in the horizontal plane and 49° vertically. The pictures measure 24 × 39 mm, and on a 36 exposure roll, the camera makes only 21 exposures.

These 21 frames show some distortion (because of the movement of the lens) but this can be made less obvious by avoiding subjects with straight lines, or by directing the camera so that the optical axis is at an oblique angle to the sides of buildings.

The Widelux has an exceptionally wide angle of view, and is comparatively inexpensive—about the cost of a Nikon F3 and an extra lens. By comparison, the Linhof Technorama costs about four times as much.

The Panon camera corporation, which makes the Widelux in Japan, also manufactures the Panon camera. This works on a similar principle, but uses 120 roll-film, and is difficult to obtain.

Occasionally, other wide angle cameras that use the rotating lens principle become available second-

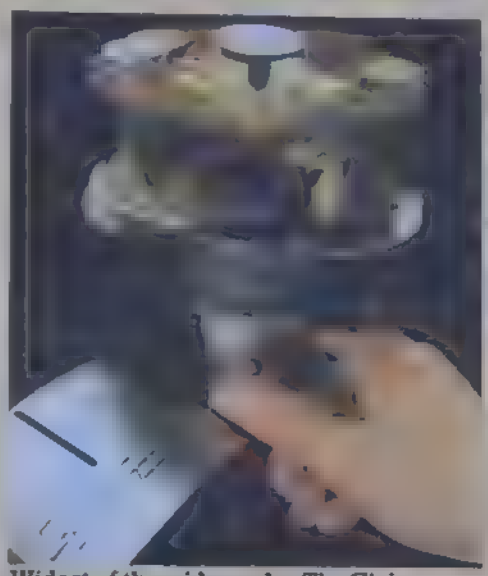
with any s

speeds of 1/15

maximum lens

Effectively, this means

speed film the camera



Dave King/camera courtesy of Tony & McAlee

Widest of the wide angles *The Globuscope panoramic camera revolves through a full 360° in a little over one second*

outdoors by day, or in brightly lit interiors. Fast film and uprated processing give an extra three stops, but in a dark church, for example, pictures would be impossible.

A moving camera

The other type of panoramic camera is that in which the entire camera revolves about a central axis. This design was once popular, and old models are sometimes used to take pictures of large groups of people. The subjects sit in a crescent formation around the camera, which revolves slowly on the tripod to make the exposure. The exposure is made through a narrow slit in the back of the camera. To compensate for the

the camera body the film s

the slit at a speed syn

it is limited

shutter as

Instead the

shutter spee

of a slit in the

carries this slit is interchangeable

the three different widths of slit sup

with the camera offer ef

speeds of 1/100, 1/200 and 1/400 s

maximum lens aperture is *f*/3.5 which limits the camera to outdoor daytime use. Furthermore, the shutter plates can be interchanged only when there is no film in the camera.

One other camera works on a similar rotation principle—the Arca-Sw

which is much more sophistic

expensive than the Globuscope. The Globuscope costs about half as much as the best 6 × 6 cm camera, whereas the Roto is four times this price. By way of compensation, it is a panoramic camera that does everything. It has an *f*/6.8 75 mm lens, producing pictures 56 × 475 mm in size. The slit at the back of the camera is adjustable in width, and further exposure control is possible by a TTL meter, which controls the speed of rotation of the camera.

The Roto has several other unusual features, including a shift lens. This is particularly valuble because panoramic cameras cannot be tilted upwards—this would simply lead to half the panorama showing a higher part of the subject, and the other half showing the ground. By raising the lens instead, the camera can remain horizontal while taking a picture of a higher part of the subject.

One revolution *of the Globuscope is usually sufficient to take in almost everything in the horizontal 360° scene*

Richard Platt/camera courtesy of Tony & McAlee

Assignment

INSIDE VIEW

Photographing a simple room interior often causes problems for many amateur photographers so we asked Michael Freeman to show us some professional tips for tackling an ordinary living room—his own

Opening shot *Direct sunlight looks nice but causes contrast problems.* **Above left** *Here, tungsten photofloods with an 80B filter.* **Above right** *Without the 80B the light was too warm.* **Below left** *Flash was bounced from the ceiling*

Photograph [illegible] your [illegible] any room [illegible] assignment the appeal [illegible] but can end up [illegible] Since there are [illegible] approaching [illegible] Michael Freeman [illegible] of the possibilities [illegible]

Probably the [illegible] graph any room is [illegible] as the main source [illegible] complication with this is [illegible]

Underlit *Using flash is an ideal way of brightening the shadowed areas, but here the right part of the picture was underlit so Michael had to add a second flash fired by a photocell*

[illegible] arrange the furniture to make a good composition and to check that all minor details were attended [illegible] removing a painting fr[illegible] avoid flash [illegible] dead leaf from a plant. To make sur[illegible] compositions were balanced and that the upright elements were perfectly vertical Michael fitted a focusing screen marked with a grid. Keeping the camera absolutely level is very important in order to avoid convergence with a 20 mm lens, so a two way spirit level was attached between the tripod and the camera

Basic set-up *For some shots Michael used a Bowens Monolite and a brolly but he also found that two hand guns would suffice.* **Right** *When bouncing flash from above, leave the ceiling out of the shot*

Metal and glassware

Metal and glass objects make attractive subjects for still life pictures. Lighting and photographing them can be difficult, but there are a few special techniques which make life easier

For those with imagination and patience photographing still lifes can be an immensely satisfying occupation, giving individually 'crafted' images that are very much your own. Once you have mastered basic lighting techniques, you can usually put all your efforts into choosing and arranging subjects. But certain subjects such as glass and metalware, require a special approach.

Photographing glass

Glass containers make most drinks look instantly more attractive, but glass presents a number of problems for the photographer. Glass must invariably be backlit to some degree. This is the only way in which to do justice to the material and its contents. Glass, because of its transparent (or sometimes translucent) nature only shows up clearly when lit from behind, underneath, or sometimes both together. Those golden glasses of beer in advertisements never seem to look as good on the bar counter, for this very reason.

Sometimes you may see a normally lit photograph shot in an advertisement but the glass container holding [illegible] perfume, cooking oil, [illegible] within the grouping [illegible] achieved by the use [illegible] shaped white, silver [illegible] reflector placed very carefully in [illegible] behind the subject. Another technique [illegible] to have a hole in the background or base, with a light shining through it to achieve the same effect.

With glass objects you must use light-

Adding black *When you have a light subject and a light background, the edges of the subject tend to disappear (below). To overcome this, place pieces of black card around the subject (opposite page, bottom left) so that this card is reflected and so makes the edges darker. This gives a better outline and also helps to give a better impression of shape, particularly with rounded subjects such as the glass, here*

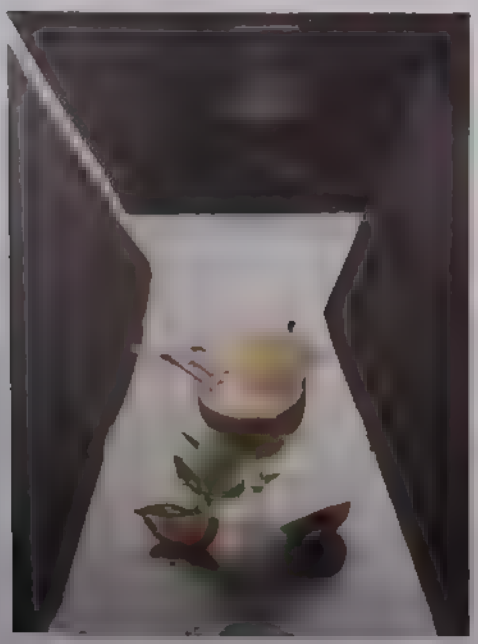
Cleaner cut *Although the lighting in the above shot is adequate for most of the picture, the blade looks rather dull. To give a brighter, cleaner look to the metal, a silver card reflector was positioned out of shot (bottom right) so that it could be seen reflected in the blade. Positioning the reflector is best done while looking through the camera as its effect depends as much on viewpoint as on the position of the card*

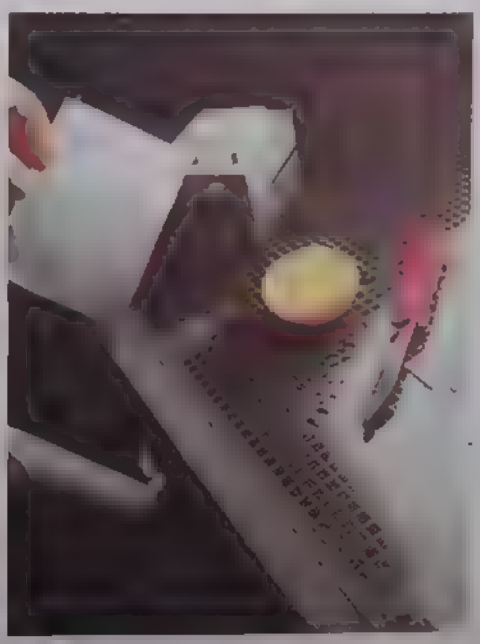
ing very carefully if you are to retain some idea of the object's shape in the photograph. Unsympathetic lighting results in the object looking flat and often confused. Backlighting helps by defining the edges of the object more clearly. But it is also useful to have some highlights on the front surface of your subject—either as small bright spots to pick out details or as patches of light to show the overall shape.

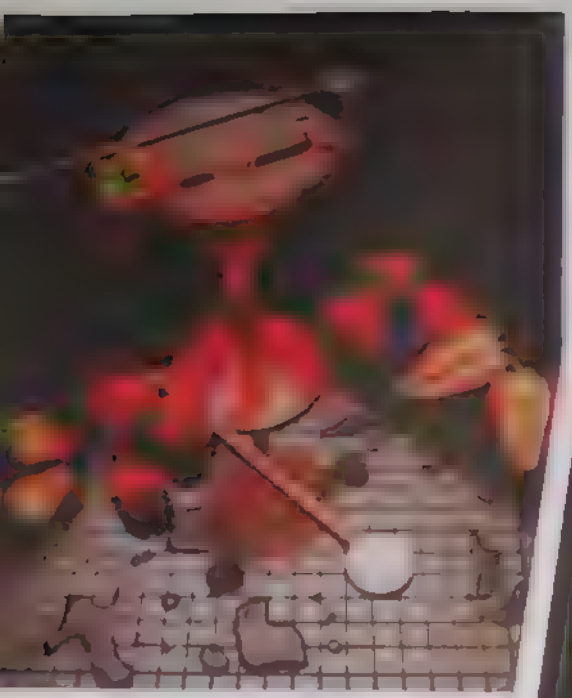
To produce small highlights use a second light with a mask over the front. The mask should have just a small hole in it—maybe three or four millimetres across—the size is advisable to experiment with different sizes. If you are using tungsten lights [illegible] there is some space between the mask and lamp reflector for ventilation, and keep checking that the mask is not getting too hot. If you are using flash modelling light is essential to determine the position for the light to get the best highlights.

An alternative is to use a torch similarly masked, and double exposure. The first exposure is the normal one using either flash or tungsten. Then, with the room completely blacked out and the lights off, make a second exposure using the torch. Trial and error is necessary to determine the exposure for the torch and you may find it necessary to filter this light if you are using flash as your main light. The correct amount of filtration should also be found by experimentation, but precise correction is not usually necessary.

If you are going to do a lot of still life work it may be worth making a special 'chair frame' table like that used by







Brighter cocktail *With [illegible] the basic lighting set-up (above) the cocktail looks unexciting and dull with little indication of colour. To liven up the shot a piece of mirrored card was placed in shot but behind the glass (below), so that it reflected light through the drink (right). Apart from making the drink look more attractive, this added highlight also has the effect of making the cocktail the centre of attention in the shot*

[illegible]

[illegible] many [illegible] from p[illegible]

Y[illegible] any matter [illegible] sure that [illegible] fairly heavy [illegible] and [illegible] (with a [illegible] text (see [illegible]

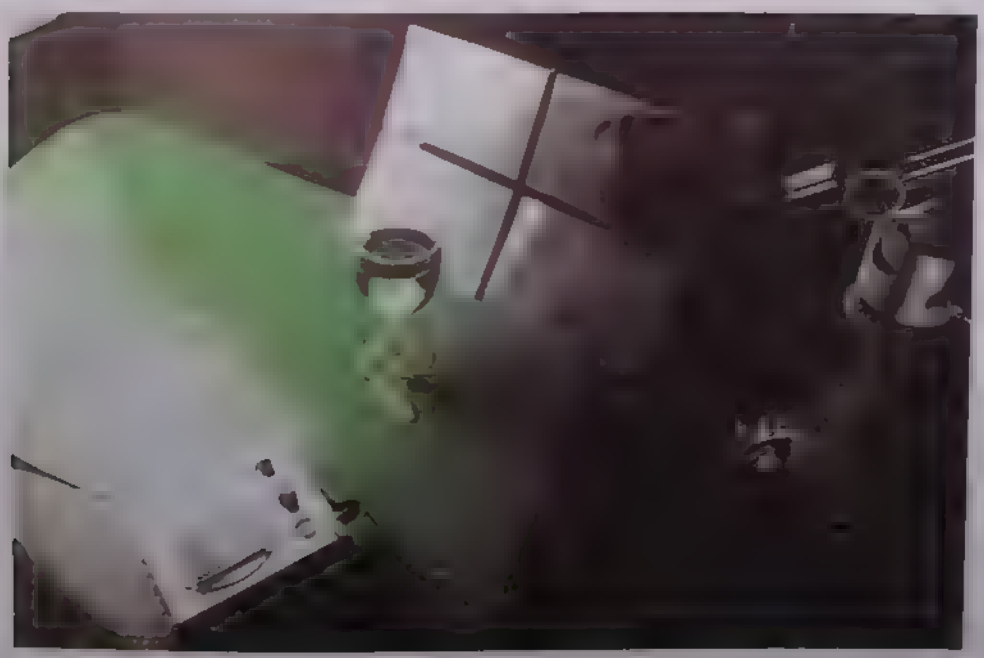
It is useful to have a [illegible] space around it [illegible] for the [illegible] close the [illegible] any and hot spots. If [illegible] only alternative [illegible] layers of diffuser, but [illegible] soft lighting. Fairly [illegible] very effective with gla[illegible] the disadvantage that [illegible] shadows. This is w[illegible] set of [illegible] second [illegible] lamp can also be [illegible] lighting source.

The technique of adding bl[illegible]

Silverware and metal

Coloured glass *It is very easy to introduce colour into a shot even when the subject itself is very drab and monochromatic (below). With glass objects, place silver reflectors covered with coloured gels behind them (above), so that the colour is reflected through the glass (right). With other types of subject, the gels can be used as reflectors, similar to that used for the knife (page 214), to add a hint of colour to selected parts of the subject*

Reflected window *In the shot above the glass looks flat and lifeless. This is mostly due to the lack of highlights in the glass. Fortunately it is very easy to add highlights using card reflectors. For this shot a reflector was placed to one side (below) the card having been divided into four with tape to simulate a window frame. The size and shape of the highlight are controlled by altering the angle, shape and distance of the reflector*



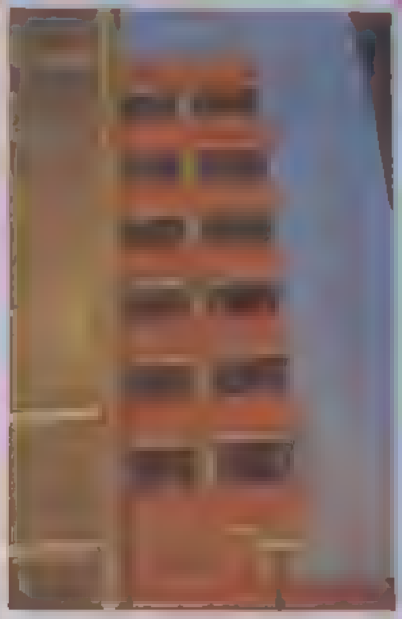
diffuser can produce [illegible] This is fairly easy [illegible] mind that the shape [illegible] may distort the shape [illegible] There can be very [illegible] of the strip [illegible] with black paper [illegible] that likely that [illegible] peculiarly shaped [illegible] source. In order to [illegible] shaped [illegible] seen from the [illegible]

The same technique [illegible] reverse. In order [illegible] controlled highlight [illegible] glossy subject [illegible] Should the diffuser be [illegible] it can be twisted [illegible] even more. It is [illegible] mentioning [illegible] cardboard [illegible] in order to do [illegible] work for you. [illegible] localized areas can be [illegible] use of handbag mirrors, cooking foil or with silver, gold or coloured plastic reflective foils mounted on to pieces of cardboard

In the city

There is plenty of [illegible] though [illegible] photographers [illegible]

[illegible] of skyscrapers and a blue sky are two elements which, if well combined, [illegible] image. This type of picture [illegible] one has to be very selective. If one decides [illegible] picture [illegible] therefore be given to showing quite clearly the [illegible] of the photograph. This [illegible] example is unbalanced, as the sky occupies a large portion of the picture [illegible] which could have been better filled with a building. I would have aimed for a more [illegible] angle of view in which the tops of the buildings would converge at the [illegible] the upper edge of the frame. Thus an abstract image in which large [illegible] surrounded by thin strips of blue sky would have been achieved.



Here, the warm colour of the building [illegible] colour of the sky [illegible] each other but this [illegible] glass windows, the brick walls, and the sky in a parallel composition producing a three-dimentional picture of patterns, light and colour

One of the technical advantages of a telephoto lens is its ability to isolate subject matter with its shallow depth of field, while cropping tightly in the viewfinder. This photograph shows that a shallow depth of field was used in an attempt to isolate the road sign in the shot, but it does not show effective or striking framing. To the right, a building appears in the distance, destroying the whole composition. To shoot road signs successfully, they have to be shown in such a way as to give the picture some impact. One has to make use of their colour, their design, and their shape to make an arresting visual statement. In this case, I would have chosen a central composition, making the road sign dominate and framing so that the background was quite free of prominent and distracting structures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Gina Lollobrigida

Already famous as an international film star, the actress Gina Lollobrigida is now gaining equal recognition for her photography which has been published in books and on the pages of leading illustrated magazines

[illegible] Lollobrigida [illegible] world of films by a chance [illegible] ck a film [illegible] me street and [illegible] her an audition She quickly [illegible] ame internationally famous But the star of such films as *Belles de Nuit* and *Buona Sera Mrs Campbell* found herself at the top of a profession which [illegible] enjoyed but which she had not chosen Photography was to be very different

Lollobrigida had studied fine arts, and her lifelong interests were painting and sculpture So it was hardly surprising that being constantly surrounded by cameras she should start taking photographs of her own She recalls 'I like studying and discovering things In the film world, it was me who was studied

Salvador Dali, 1977 *A portrait of the photographer's friend Salvador Dali, the famous Surrealist, as he displays one of his paintings at his home in Cadaques, Spain*

Children of India *The etched, careworn expressions of these two young girls have been caught in a compelling and vivid image of the face of poverty*

China 1981 *(far left) Framed against a [illegible] woman carries her baby on her back as [illegible] the [illegible]*

Woman in a sari *[illegible] the [illegible] from her background. Lollobrigida has [illegible] attention on the strong colours and sensuous folds of the sari*

Fidel Castro, 1974 *Taken in Cuba while Lollobrigida was making a film profile of the famous revolutionary*

to mai

Italia

persona

Rapt attention *(far left) A touching portrait of two young girls from a small village in the Philippines taken for Lollobrigida's book on the country, 'Le Filippine'*

Lima 1979 *(left) The bright red of this Peruvian Indian's skirt brings life to a simple picture of a street seller in Peru's capital city*

landscape. Lollobrigida de [illegible] same amount of attention to a s[illegible] in Naples as she does to a portrait of a public figure. People are her prim[illegible] interest and photography is her way of recording their daily lives. She has little time for the standard tourist attractions unless they contribute to the meaning of a photograph. St Peter's Square in Rome, for instance, provides an ironic background to a shot of a group of young priests having a snowball fight.

For Lollobrigida, photography is a constant process of discovery and she is fascinated by the way in which one subject can lead to another. This is true even in her own country. One day, by the

caught
They had
kind
However

photography Lollobrigida feels that speed essential—certainly many of her s bear this out and she has take remarkably effective candid scenes When she has more time to shoot, she composes carefully as she dislikes cropping and feels that the photographer should be able to compose almost all shots in the camera In order to give herself maximum freedom of composition, she uses a number of lenses, rarely limiting herself to only one lens or viewpoint for a given subject

Although she feels that composition is very important at the taking stage, Lollobrigida sets great store by darkroom work She does all her own developing and printing, both in colour and black and white, and greatly values the flexibility and control this gives her Apart from darkroom work, however, she is not interested in technique for its own sake, and rather wishes someone

Pipe smoker *This sympathetic portrait taken at Baggio in the Philippines has caught the humour and warmth of this old woman's character*

Indian summer *Youth and age framed beneath floating banners swinging gently in the breeze*

Elegant timing *Lollobrigida used her unique system of photomontage to create this publicity image for Piaget*

Mother and child *The lively face of this young Kenyan tribeswoman makes a fine portrait*

Even though an acting career has been her route to stardom, Lollobrigida is quick to confirm that it is her photography that has brought her the most satisfaction 'In films you are at the mercy of a director, whereas a photographer is alone ' Thus, being able to develop her photographic interests will continue to be the most important aspect of her creative life

Hiring studios and models

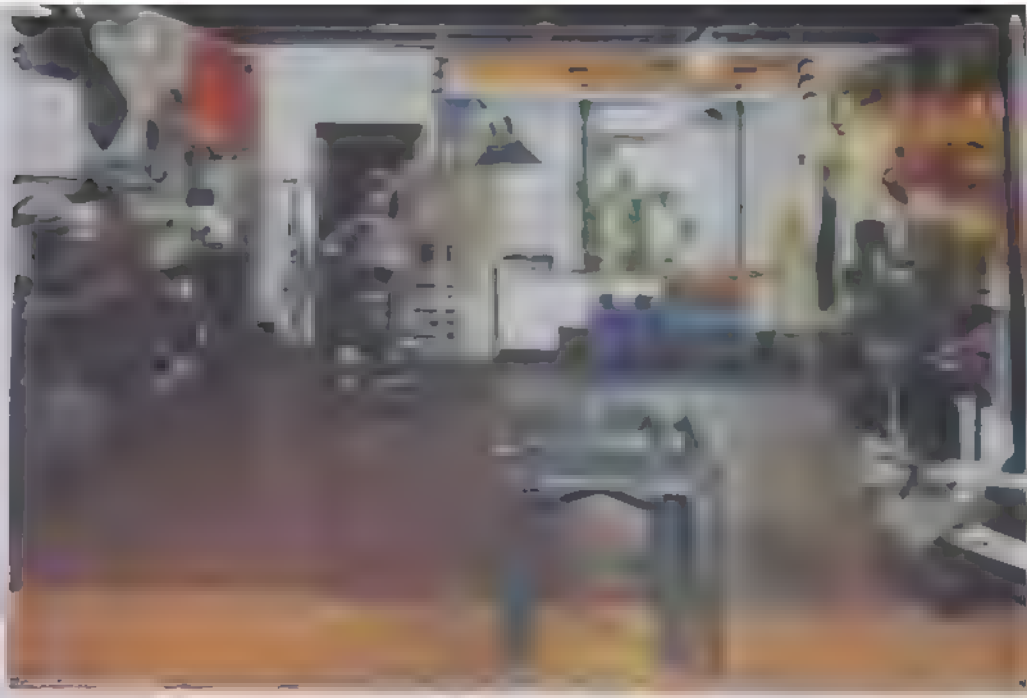
Hiring a professional studio, equipment and model can increase the scope of your photography considerably. But you should know what to look for before you start

Choice of studio

Amateur studio *The essentials of a small amateur studio include a clear floor free from obstructions, a high ceiling, plenty of space for equipment and complete control over the amount of daylight entering the studio. Large windows are useful, but must have blinds to block out light completely*

Large professional studios *are expensive to hire, and they are usually booked several months in advance, but the type of facilities they offer might be necessary for some amateur work. Photographing a car, for example, requires bulky purpose-built reflectors to give a uniform diffused lighting and plenty of space*

Studio equipment *To make th*



Basic requirements

example the most suitab
be one offering a multipl
suspended mock walls and
ceilings with a choice of different s
wall decor windows doors and fur
ings Such a studio would also have
props such as furniture ornaments
books workable fixtures and fittings

Studio kitchen *If you intend to photograph foods, a built-in studio kitchen is essential. Many studios have a basic sink unit but relatively few are as well equipped as this specialist one*

Space to shoot *A surprisingly large amount of space is required to photograph even small objects Much of it is taken up by equipment such as support stands and lighting gear*

Choosing the right model *for a particular job requires skilful judgement. But to help*

Booking *After short-listing potential models, speaking to them, or the agency, will help you decide who to book*

the studio. Polaroid film checks help you to monitor exposure, composition and sharpness before exposing your film for the final result.

If you are inexperienced in the handling of complicated camera and lighting equipment, some studios may require you to hire a technician and assistant. Although this will add substantially to your hire fee, it is also time saving, and safeguards against breakages and fouling up of equipment through misuse. You are liable to pay for any damages, whether or not an assistant is present, so it is important that you obtain insurance cover for any such incidents and for injuries to personnel.

Hiring a model

If your session in the studio requires a model, you will need to be equally thorough in planning to hire one. It may be to your advantage to hire a studio that employs models or has a list of models, giving measurements and pictures to help you choose. By this method, you will simplify the hiring procedures because you deal with only one hirer.

pictures of models, occasionally informing you about past modelling occupations. More insight about a model can be obtained by looking at their show cards, portfolios or book. These contain the best of a model's work and enable you to judge the model's aptitude to adapt to any situation or setting.

Usually, agencies specialize in the type of work their models do—such as

Interviewing models *is a way of assessing their suitability for the job.*
Facilities *(below) At the very least you must provide a changing screen and well-lit mirror for the model*

they might have to forego more prestigious work.

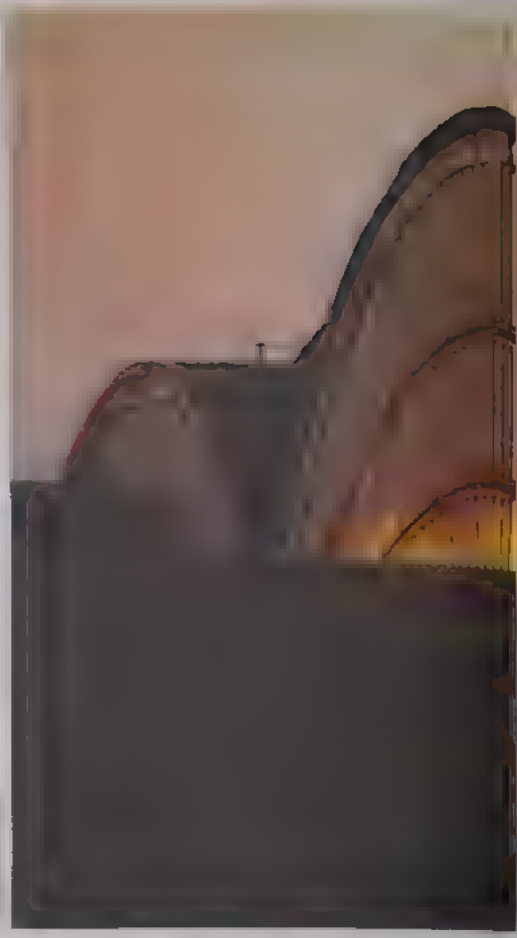
The greatest obstacle to the amateur [illegible] however is the cost of pro- [illegible] The more a model [illegible] fees become [illegible]

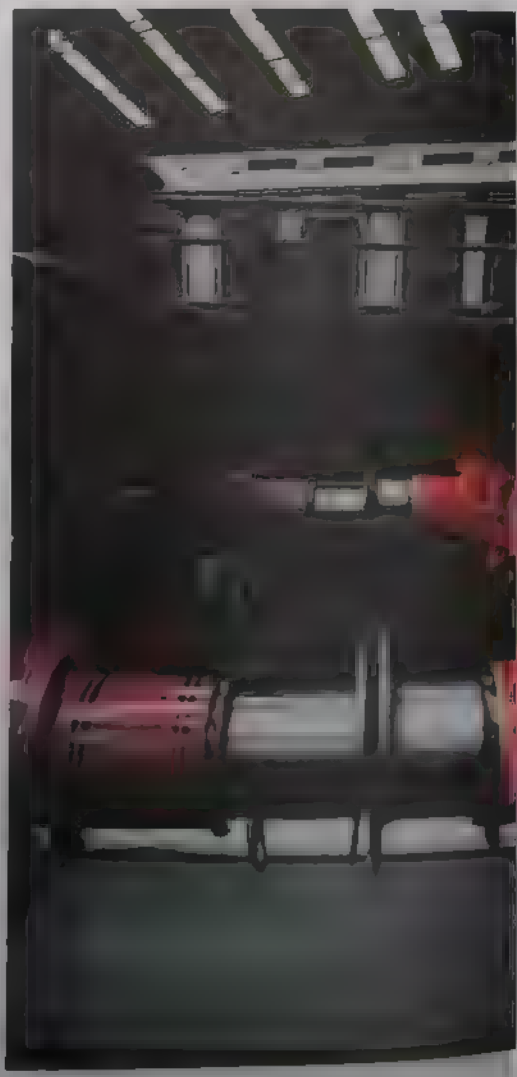
Model release form *If you want to sell pictures from the session, the model must sign a release form giving you the picture rights. You can draw up your own form based on the example shown here, or modify it to suit*

Assignment

Railway museum

Stuart Windsor shows how a varied range of shots on the theme of machines can be created with minimal equipment

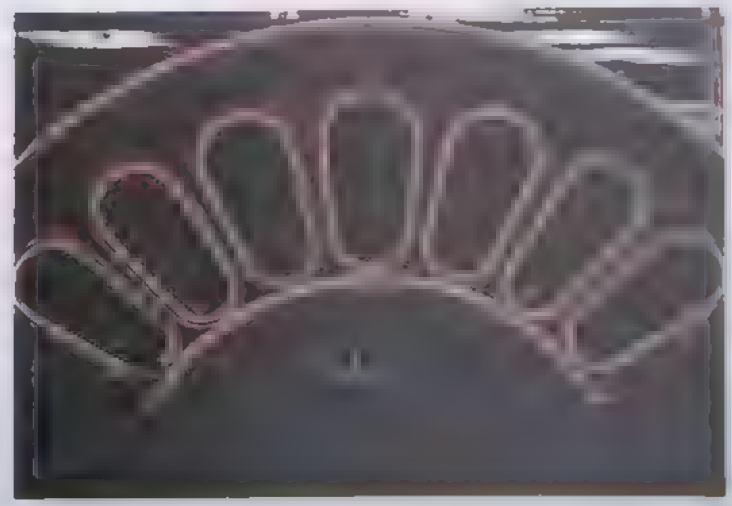




Coupling rods *To give a softer look to the matt steel low contrast Ektachrome 200 was used* **Buffer to buffer** *A 26 mm lens helped Stuart give equal emphasis to foreground and background*

York railway station

Coachwork details



Creative approach

PORTRAITS

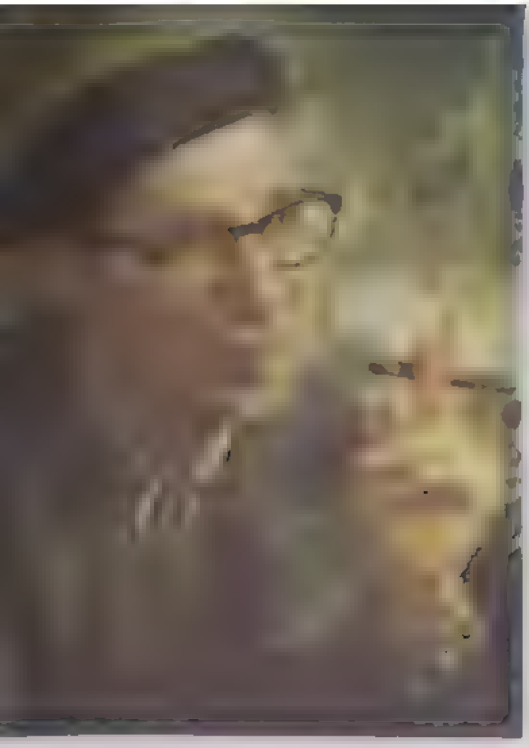
Many people feel that there is a limit to how creative you can be when shooting a formal portrait but this view overlooks the wide range of approaches embraced by this area of photography

Folded arms [illegible]

Smoker *By pos[illegible] subject's head [illegible] in the frame, the [illegible] been able to feature the [illegible] part of the [illegible]*

Lady at home [illegible] *surrounding [illegible] more [illegible] However [illegible] be care[illegible] distracting background*

Frame within frame *To make a statement about the man and his work—he is an architect the photographer created an organized, graphic shot*

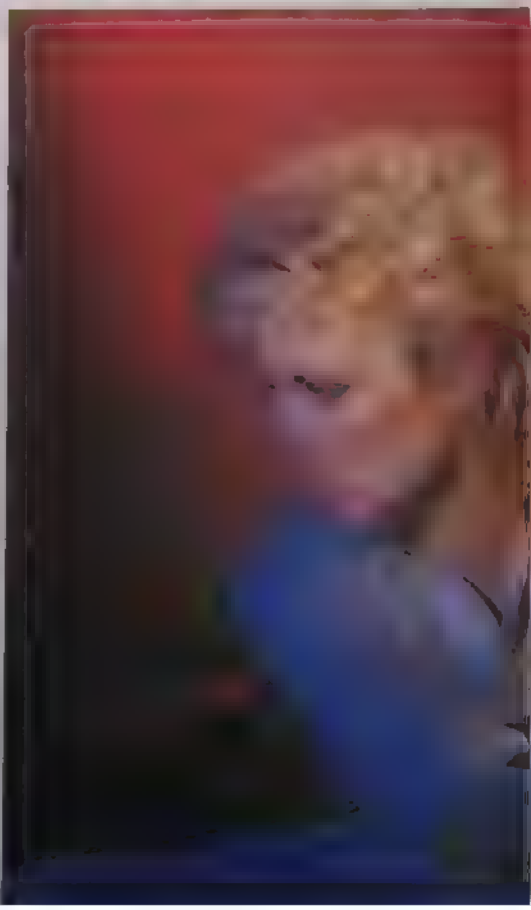


Truman Capote *The shape of the hat and the positioning of the subject low in the frame created this striking composition*

[illegible] ne dresses [illegible] aggressive or [illegible] t they will be quite happy [illegible] which reinforce those [illegible]

There are also different ways of handling the session itself. It is usually preferable to talk directly to the subject and to get them to respond to you, rather [illegible] interested [illegible] personality than a [illegible] subject is less self-cons[illegible]

When faced with your subject often the hardest thing is actually getting the session under way. Even professional portrait photographers can have this problem, and one solution is to have a stock of poses which you know work [illegible]



Man and his music *While backgrounds should usually be*

Fashion designer *centrally, try us.*

Singer's profile *The sweeping lure*

Clay Perry

Window light

Young girl

Here the directional illumination has been used to bring out the texture in the wall and to cast unusual, striking shadows

Lana Turner *This has all the elements of a classic portrait – careful lighting, composition according to the rule of thirds and the bold shapes described by the subject's limbs*

[illegible] depending [illegible] achieve. There [illegible] perhaps [illegible] the top of [illegible]

There is also a need to think about whether or not the main subject should be framed centrally or to one side of the centre. General principles of composition apply just as much to portraiture as to landscape or any other type of photography, so that framing the main subject in accordance with the 'rule of thirds' is often a safe choice. Of course, though this does not have to be observed rigidly and it is a mistake to adhere strongly to a fixed set of rules.

Some portraits aim to flatter the

hadows althou
very effective to
strong shadow part

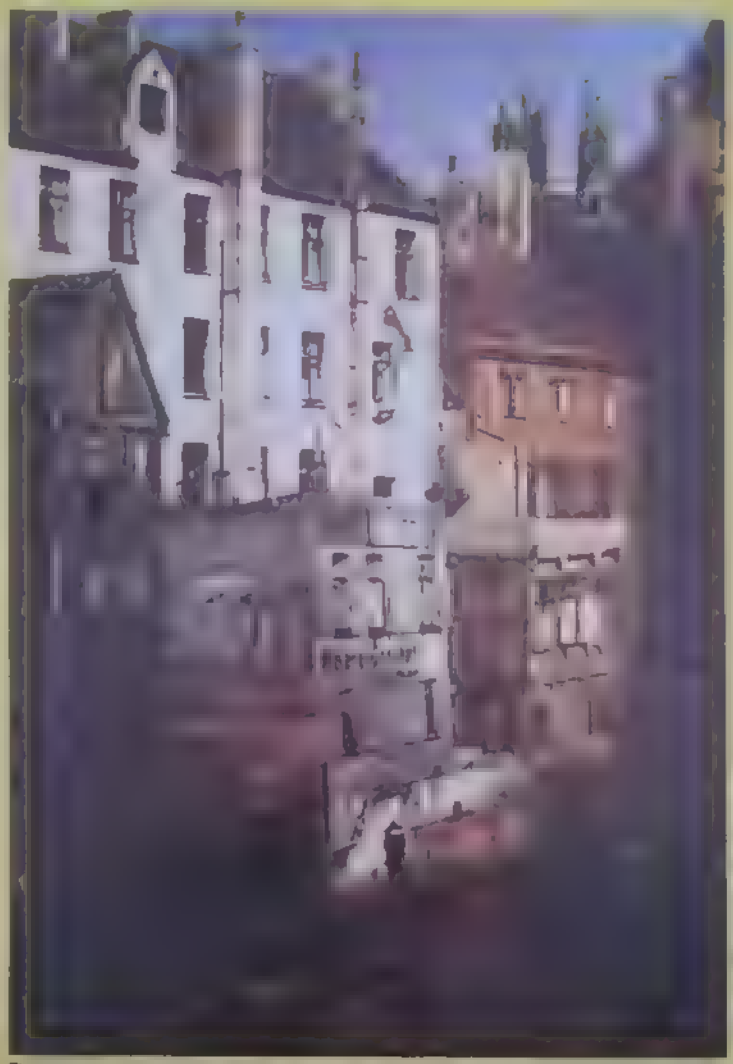
In your search for an interesting and revealing portrait, it is a good idea to look at those taken by famous portraitists. There is often a clear style associated with each one and with specific eras. Pictures taken in the first half of the century, for example, tended to be rather stylized and relied on strange or dramatic lighting for their

around The
toward
often completely for
favour of everyday suit

Photographe
range of techniques t

Colour printing papers

Colour prints have come a long way since the days of carbon tissue prints which called for great processing skill—modern colour papers can give superb results with a minimum of effort



Pinatype print, 1904 *Like many early colour prints, pinatype used selectively hardened gelatin images made from separation negs*

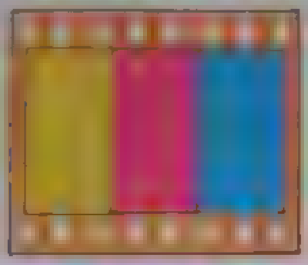
Carbro process depended not on the action of light on gelatin but upon the discovery that bichromated gelatin as hardens in contact with silver. So the carbon tissues could simply be held against the normal b/w print and the silver in the image would harden the gelatin in the right areas. The *imbibition* or *dye transfer* process introduced as Pinatype in France in 1903 involved using hardened gelatin images from three separation negatives to almost literally print the dyes on to white paper.

Because colour prints involve layers of dye images they cannot use additive colours (see page 1941) – though some of the additive screen processes were developed to give additive colour screen prints. But screen prints like the modern prints used subtractive colour dyes in yellow, magenta and cyan. Indeed the convenience of subtractive colour was exploited in prints long before it could be used in films.

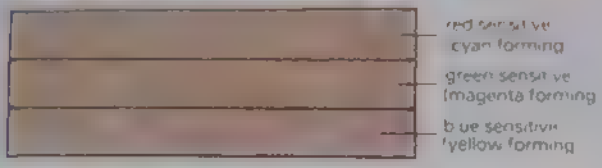
All these processes carbon, Carbro and dye transfer, could give superb richly coloured prints but were long and elaborate involving three separation negatives and many processing stages. So when tripack films with three emulsions of different colour sensitivity were developed in the 1935

Prints from negatives

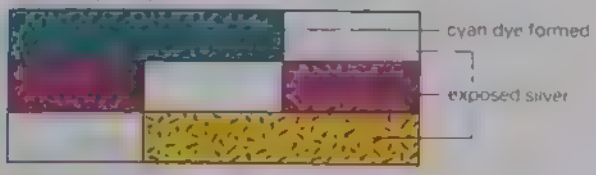
Prints from negatives



Unexposed print



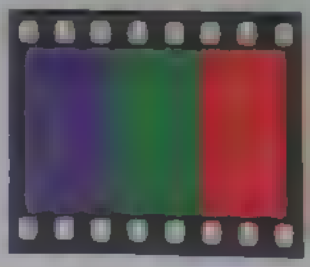
Developed print



Bleached print

Like colour films, neg–pos papers use colour couplers in the emulsion to form dyes in exposed areas, making a positive print. But the red layer is at the top for extra sharpness

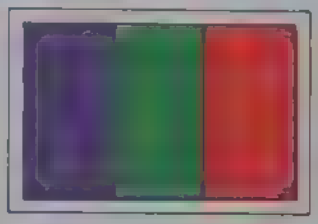
Cibachrome: dye destruction



Unexposed print

Developed print

Bleached print



In dye destruction papers, the dyes are incorporated in the emulsion but during processing these dyes, along with the silver, are bleached out leaving a positive image

Chris Lyons

so that the yellow filter can be incorporated in the tripack to absorb unwanted blue light during exposure

However, because printing papers do not have to be as fast as films, the need for the yellow filter can be avoided by using silver chloride as well as bromide in the emulsion. Silver chloride is sensitive to violet rather than blue light, so it can be sensitized with dyes to red or green while remaining relatively insensitive to blue. If the red and green sensitive layers are unaffected by blue light there is no need for a yellow filter. The red (cyan forming) layer can therefore be put at the top of the emulsion layering to help give a considerably sharper image.

Dye destruction

As in most colour processes, the dyes for colour print paper for printing from negatives are formed during processing. But this is not the only possibility. The Cibachrome process, which is by far the most popular method for making prints from slides, works by starting with all the dyes present and then destroying those not wanted to form the image.

The principle of dye destruction was suggested in the 19th century by Karl Schinze, but early prototypes were not successful. In the early 30s Dr Bela Gaspar produced his Gasparcolor process which depended on the destruction of dyes in proportion to exposure. It was never as successful as it could have been, though the movie film version was popular. But it formed the basis for the Cibachrome process.

In manufacture, each of the three layers of Cibachrome is filled with the appropriate coloured dye. Because of the uniform dye layers, it has a dark grey-brown appearance. And as the top blue sensitive layer is coloured yellow, there is no need for a yellow filter layer.

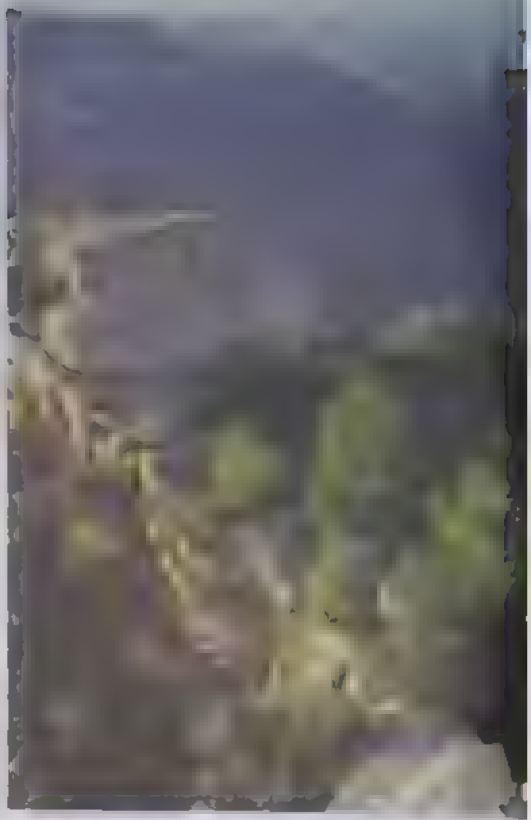
When the paper is exposed to the slide and developed, a black and white negative image is formed by the silver in each emulsion layer. But in the next processing stage the specially [illegible] bleach works on not only the silver but also the dyes wherever there is silver [illegible] that is, precisely where the dye is not wanted. After fixing and washing, the result is a positive dye print.

Although it is slow (because the dyes reduce the light reaching the silver bromide), Cibachrome is very simple to process and gives extremely good colour. The reason for this is that the manufacturers can work with the whole range of *azo dyes*. With normal, chromogenic emulsions, on the other hand only dyes that can be formed with colour couplers can be used. This not only reduces the [illegible] of the print [illegible]

Improve your technique

Filter tips

You can cope with most situations with just a small group of filters. But to get the best out of them it is essential to know when, and when not, to filter



Cooler sun *Sunsets are sometimes too red (above). You can easily rectify this by using an 82A filter, which cools the colour without ruining the atmosphere*

Michael Joseph

If you shoot in blac orange and red little For colour similarly small, but no though the extent reduces haze depen lighting conditions The maxim is obtained when the sun is at 9 line of view

More often than not there is little you can do about reducing haze And sometimes the haziness itself is not a problem though its colour might be Both haze and

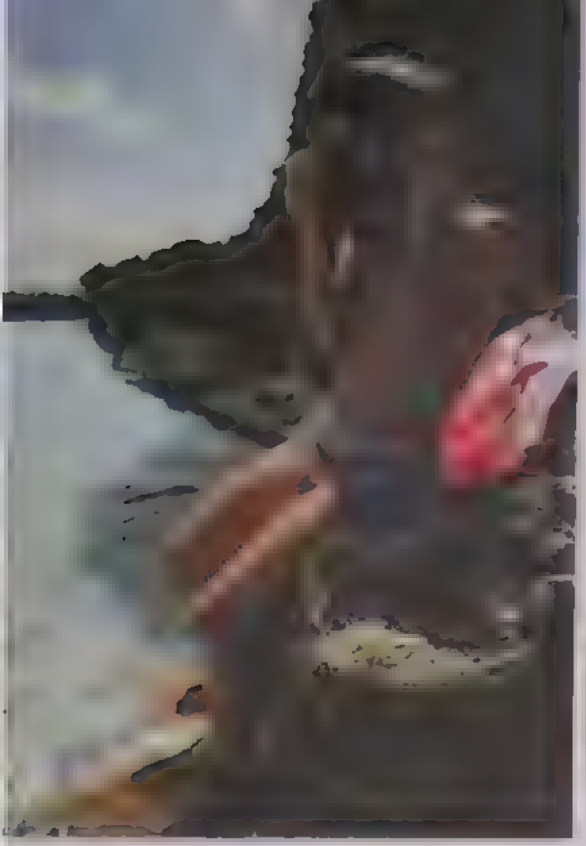
Canyon haze *You can sometimes use a polarising filter to cut down haze. It depends on weather conditions and the position of the sun. In the shots above the sun was at approximately [illegible] the photographer's line of view. Using a polarizer (left) makes [illegible] detail much greater than in a shot without one*

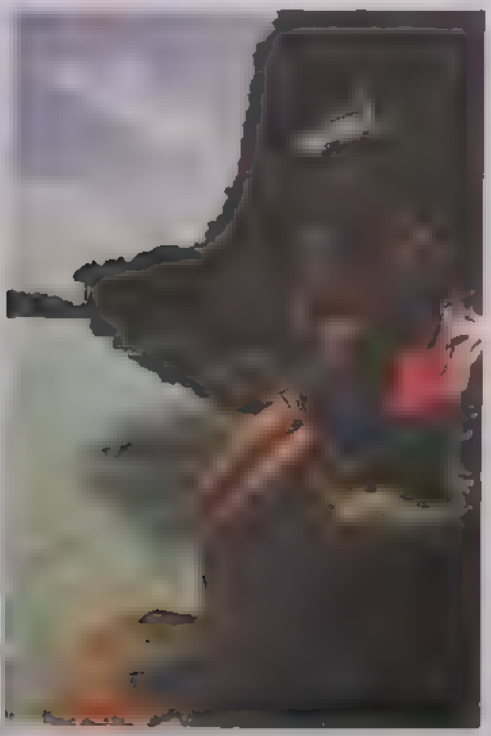
Water glare *This kind of overall glare (right) is common in overcast conditions but is very effectively reduced using a polarizer (left)*
Bright sky *In bright but overcast conditions the sky records as a boring, burnt out white (right). This is rectified using a graduated filter (above right)*

mist tend to photograph very blue. Occasionally this blueness can be attractive, but it is usually better to warm up the scene using an 81 series filter. An 81B is usually sufficient—anything stronger over-compensates and the result is an orange picture. Judging the amount of filtration needed is not easy, but generally the thicker the mist, the more filtration is needed, particularly if there is cloud as well.

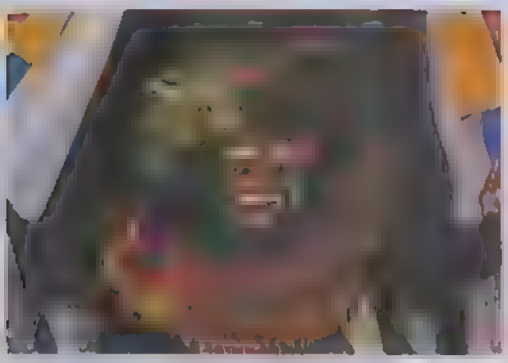
Cloud on its own can also be difficult to filter for. Low, dense cloud makes the light very blue, so an [illegible] required. But you should [illegible] matically use a filter whe[illegible] cloud. High, thin cloud—the type [illegible] gives overcast but very bright skies—has little effect on the colour of the lig[illegible] and an 81 filter would give very orange results. It is better not to use a colour correction filter at all in these conditions.

The filter that is useful with bright overcast skies is a graduated type. This type of sky tends to come out as a bland white in pictures. A grey graduated filter





When to warm *Many people use an 81 series filter only when it is cloudy. But even when it is sunny you may find that the picture is too cold. This is particularly noticeable when the subject is in shade (left), or if there is a lot of sky and water in the shot (right). It is a good idea to use an 81 in these conditions, especially for skin tones (above left). You may even like to try using slight over filtration for effect (above right). A warm filter is also useful in mist. Unlike haze you cannot reduce the mist, so it is simply a case of making it an acceptable colour. With the shots below neither is 'correct' but the warmer colour seems more suitable.*



Strong and subtle *UV filters have no visible effect on haze. The two parts of the shot above were taken with and without a filter, and there is no difference between them. In the shots of the dancer, flash was used for the main lighting. This gave a cold, stark result (left), so a yellow filter was used to simulate the original candle lighting. In the shots below, a pale magenta filter (right) has been used to remove a green cast caused by light reflecting from the foliage near the subject*

Warming the flash

Using flash without a filter tends to give results which look cold (bottom right). A 10Y yellow filter (below) corrects the blueness to give more natural colours. But if you want slightly richer and warmer flesh tones, it is a good idea to use an 81A filter rather than the yellow

Using an airbrush

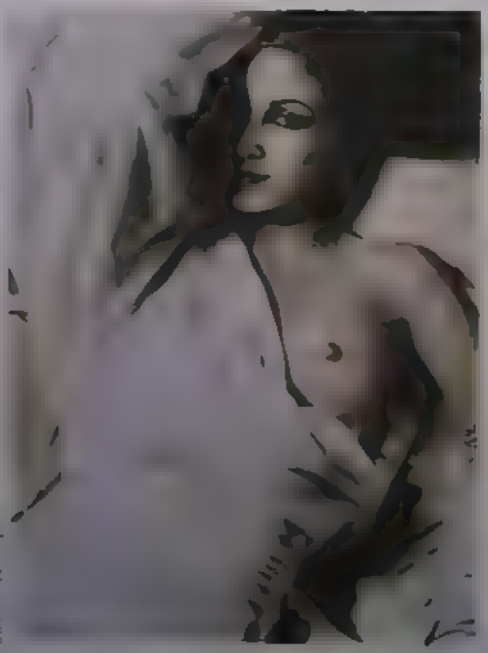
An airbrush is a tremendously useful retouching aid, as well as a highly creative tool in its own right, which can be used to add or change detail or areas of tone on your prints

An airbrush is a [illegible] precision [illegible] spray gun [illegible] spray gun and [illegible] that the nature [illegible] airbrush [illegible] adjusting the [illegible] supply and [illegible] can use an [illegible] match [illegible] perfectly retouch any image. The spray can be a heavy 'spatter' or a fine mist over a wide or [illegible]

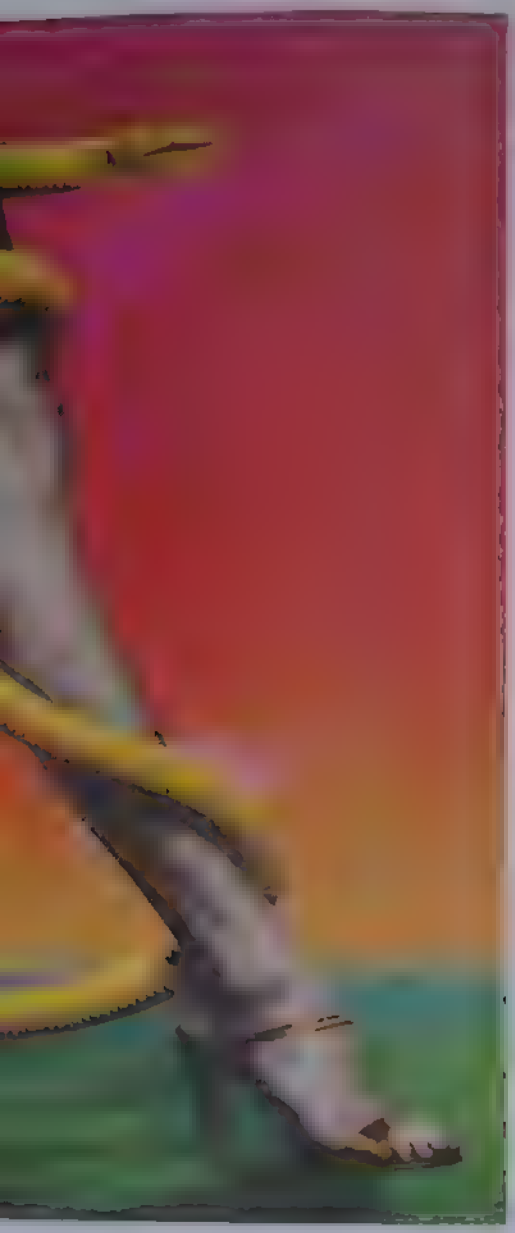
You will [illegible] need a conventional brush to retouch small details such as hair lines and spots, but by using the airbrush corrections to large areas of the print can be almost invisible. But, it must be said, only with considerable [illegible] employed can give the picture a super real [illegible]

Special effects such as the invisible joining of images on multiple prints or removing backgrounds are easily accomplished with an airbrush. You can create false information such as the addition of clouds and [illegible] And you can add [illegible] black and white prints. In extreme cases, you can even rework an image or a subject which is unsharp, too flat, or lacking in impact and detail. Advertising stills, like photographs, are [illegible]

Art and photography *Using an airbrush on photographic originals makes it possible to create surrealistic images such as this*



Adding colour *Two black and white images subtly and delicately retouched in colour with an airbrush*



Detail removal *The presence of the TV aerial detracts from the old world charm of this building—but is easily airbrushed out*

Airbrush construction

Airbrush operation

[illegible]

[illegible] keep the same [illegible] on the button [illegible] air supply is not [illegible] will be [illegible] drops the [illegible] If you [illegible] should [illegible] le to balance e[illegible]y the grain [illegible]ure of the original

[illegible] work of a particular [illegible]ty you can [illegible]t the colour [illegible]tant rate by [illegible]ting the cam ring which is situated behind the control button. Undo the cam ring locking screw then turn the ring clockwise to draw the needle away from its nozzle. Lock the ring when you have reached the required volume. With this method a set amount of colour is released just by pressing down on the button, but you can still release more colour by pulling back the button further.

You need a constant supply of compressed air to operate the airbrush. This air must be clean, free from dust and grit, and free from oil or water vapour.

Small electric compressors, with reservoir, valve and air filters are now quite cheap, but tins of 'liquid' air are becoming increasingly popular.

Common spray faults

a) Airbrush texture too coarse
increase the air pressure

b) Uneven broken-line spray
the pigment is probably too coarse. Remix the colour and wash out the airbrush

c) Spray heavier one side than another
there is a blockage in the air cap

d) Colour leaking from nozzle with the needle closed: colour has dried in the nozzle, remove it and soak it in solvent

e) Colour splatter or spitting
failure to depress the button *first* to release the air

1 Basic airbrushing equipment consists of airbrush, compressed air, suitable inks, masking tape and film, and mixing, cutting and cleaning utensils

2 Always practise brushing techniques beforehand to ensure everything is in correct working order. Practise, too, the brushing strokes you will be using

3 Some form of masking is nearly always needed to protect parts of the image from spray. Cut masks large enough to cover the print and its mount

7 When the previous application has dried, you can spray on the base coat in a tone which matches the rest of the print. This acts as the base for fine detail

8 Add fine detail gradually, allowing each coat to dry before applying the next. Practise on unwanted prints until you are sure of your technique and the effect

9 When the final coat has dried, carefully peel back the masking film and discard it. Remove the print from its backing if a temporary mount has been used

often completely retouched in this way 'Cut-aways', such as the insides of car engines, are combinations of pure photographs and airbrush retouching

Preparations

It is important to see well when airbrushing so work in good light Use a bright strip light, or an adjustable lamp [illegible] on a high stool and tilt the print towards you on a board

Apart from the airbrush and colour mixing equipment (see below), you will need card or proprietary materials for masking, masking tape, a scalpel, and a [illegible] ing glass for fine work Most art [illegible] ns which [illegible] with airbrush, accessories You [illegible] and [illegible] 3 and 13 for spotting [illegible]

your print with a weak solution of ammonia to degrease it

Using an airbrush

Before you start work on any print, thoroughly familiarize yourself with the operation of the brush (see panel) and practise getting the effects you want on pieces of blank card

The spray liquid in the reservoir is always called *colour* whether it is intended for black and white retouching, or coloured for colour work You can use black or white paint, water based artists colours, oil colours, and spirit dyes—indeed anything thin enough to be sprayed easily. But the colour must be free from any grit that may block the nozzle set of the brush Avoid colours which dry and cake easily these clog the airbrush It is best to buy tubes of specially manufactured airbrush [illegible] which are easy to dilute to the correct [illegible] consistency with clean water Remember to replace the cap of [illegible] after use [illegible] the air supply [illegible]

out any dust in the hose Then attach the lead to your airbrush You need to set the air pressure differently depending on the type of colour you use Follow the manufacturer's instructions for any particular type of colour. In general, spirit colours need less pressure than oil-based or *gouache* (thick, opaque water colour) paints. There is no advantage in setting the pressure too high, and too much air will dislodge stencil films, if you use them on the work

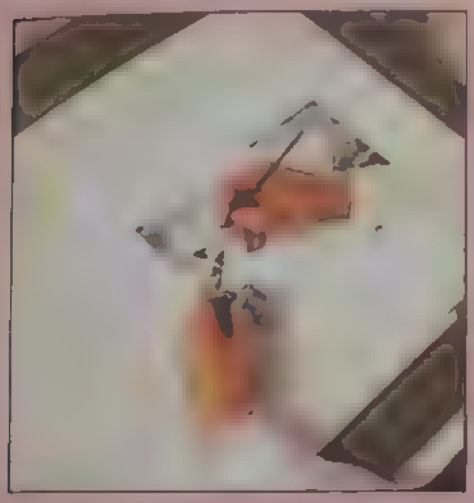
Mix gouache colour on a clean palette using a round hoghair brush (No 5 or 6) Use turpentine to dilute oil colours, or clean water for [illegible] only dilute the [illegible] it to flow [illegible] should just drip [illegible] You can spray [illegible] strength [illegible] adjust the [illegible]

[illegible] must [illegible] white and [illegible] the [illegible] paint [illegible] the [illegible]

4 With a new scalpel blade, cut through the mask—but be careful not to damage the print below. Cut into areas of dark detail to avoid a 'halo' effect

5 Carefully peel back the mask film from the area to be worked. This can be discarded or reapplied for subsequent work in other areas of the image

6 If, as here, you are removing detail from a photograph, begin by spraying suitable opaque over it to match the colour of the surrounding area



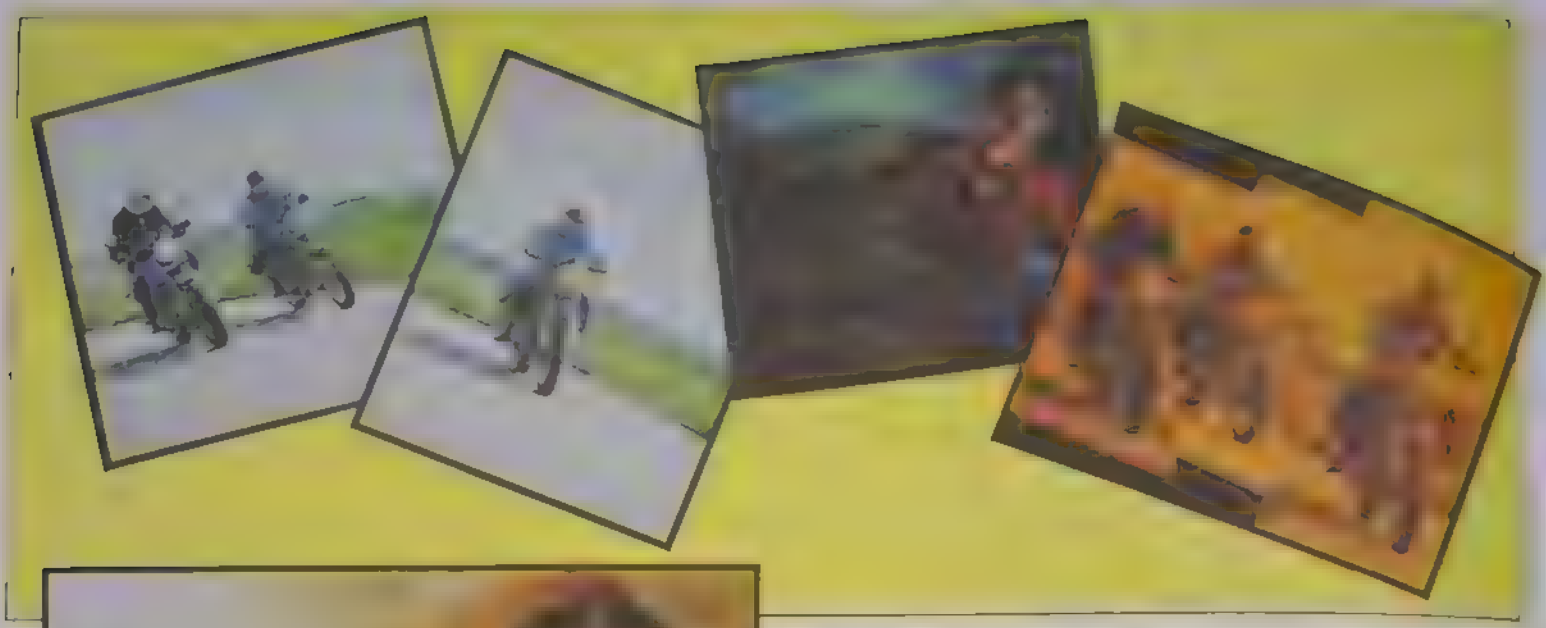
10 Some retouching with a brush may still be necessary—particularly if you wish to add fine detail which is beyond the scope of an airbrush

the manufacturer, load the airbrush by wiping the hoghair brush downwards into the reservoir, until two-thirds full

Operate the control button as described in the panel, and practise making strokes on a sheet of scrap paper, stopping the colour flow only at [illegible] the button depressed to continue the release of air Always move the nozzle of the brush smoothly and parallel to the surface to give an even distribution of colour—simply swinging the brush from side to side gives an even spray tapering out at either end of the swing

To build up tints, overlap each stroke by half so that the coverage is even For solid colour application the airbrush should be about [illegible]

Chopped chopper *The helicopter in this shot (above) spoils the authentic 'ranching' feel which is presented quite effectively in the rest of the photograph, and the sky is rather flat and featureless Below, the same shot with the helicopter airbrushed out and detail added to the sky to strengthen the image*



Montage *Airbrushing is used extensively in advertising to create 'impossible' images which may or may not stem from single images. Here, three originals were combined in stages to give the image at left. This was then airbrushed to add and tidy detail*

Always be sparing in your use of colour because if you release too much you may flood the work with liquid colour, and splatter it in all directions Build up colour by repeated applications rather than in one heavy coat To spray a graduated tint, start close to the work with a dense band of colour and pull the brush back, working away from it Raise the airbrush at each stroke and as you work move away from the dense edge In this way you can build up a tint which changes in density from dark to light yet shows no hard lines in the transition

Stencils and masks

In order to stop colour spreading to areas where it is not wanted you will nearly always need to mask your photograph as you airbrush it Even the most experienced worker, when spraying fine details and retouching close to the print, uses masks to keep the rest of the image clean, and clear of colour drift

The simplest masks involve taping down strips of thin card with removable masking tape that does not leave a sticky mark on the print You can use masks for sharp or unsharp masking Card which is [illegible] print along [illegible] differently. Be very [illegible] stretching the film when p[illegible] the print Again this [illegible]

Preserving an airbrushed image

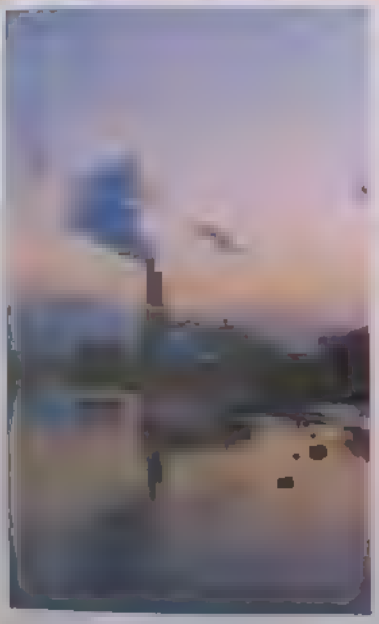
Airbrushed images are very delic[illegible] and are easily smudged or damaged with rough treatment. Indeed, if your results are unsatisfactory, you can remove all the airbrush work (except colour-dye work) by washing it off quickly with cotton wool soaked in a suitable solvent

To preserve a particular effect, copy your result on to a suitable film type using your camera or enlarger Or you can protect a finished print by filling the airbrush with a solution of clear gum arabic and evenly spraying the whole print. Alternatively, use a proprietary matt or gloss print spray, which also includes an ultraviolet fade-resistant coating. Spraying the print also helps to make airbrushed areas indistinguishable from original print areas, as it unifies the surface texture Like all valuable photographs, you should protect an airbrushed print with a sheet of clean paper or tissue

What went wrong?

City at dusk

Twilight pictures often appeal because of their strong colours. But as Sergio Dorantes points out, you should still pay attention to detail



The colour shades and nuances recorded on the film have produced an evocative and emotional picture. [illegible] points were overlooked when the picture was taken. The sky's colour is washed out spoiling the effect. Furthermore, the composition is not balanced. A very important element of the composition is the reflection of the [illegible] smoke and this is partially [illegible] excluded from the picture. I would [illegible] the whole reflection of the cloud of smoke and given prominence to the foreground.

Scenes at dusk can be magically transformed by the quality of the light. Often the photographer is overwhelmed by the colour and the light, rather than by the scene. This happens here. There is no organization to this picture and the pattern formed by the city lights is not strong enough to produce a picture with impact. The area at the top of the picture is empty of detail and does not add interest to the image. Exposure should be more generous to reveal more detail on which the eye could focus. If I had to take a photograph of this scene, I would have tried to compose it more tightly, using a longer lens and concentrating on one part of the scene rather than the whole.

If I were forced to use the same focal length, I would have given a longer exposure to get the lights of the moving traffic to paint lines of colour, thus giving more interest to the picture. I would have also tried taking a different approach to the same scene, such as moving the camera during exposure, or using a diffraction filter or a prism, all in order to give a more imaginative presentation of a dull scene.

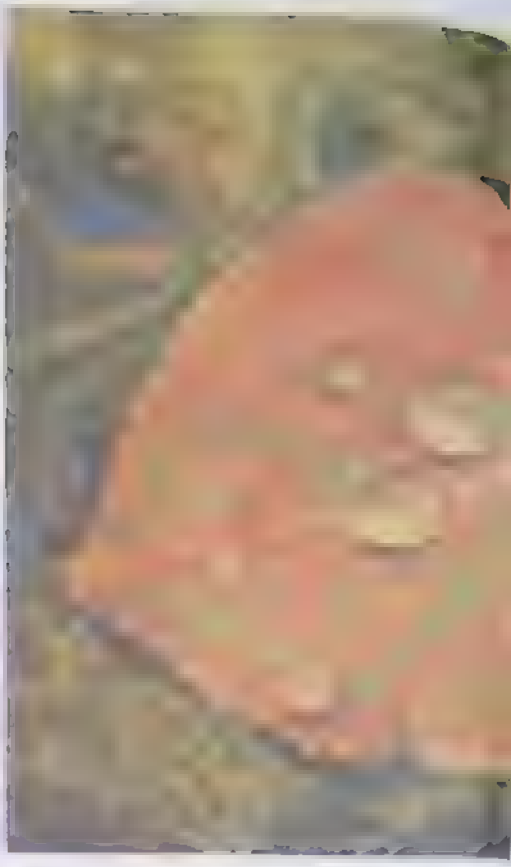
The photograph was taken from the top of New York's World Trade Center.

Autumn

Autumn brings much more than its immediately obvious flashes of bright colour – its muted tones and soft light should not be overlooked. Incorporate the elements of contrast in colour, shape and scale for more interesting shots

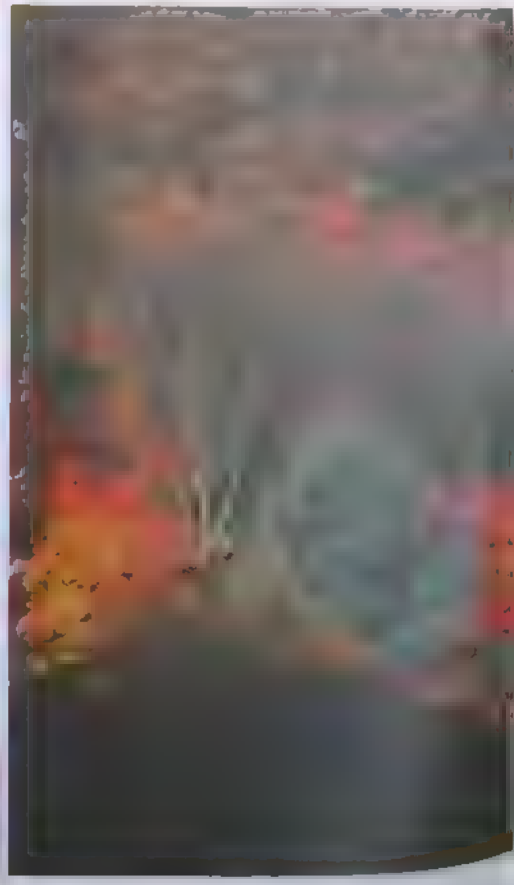
Small scale *Without the area of bright orange of the toadstool, this shot would have lacked impact. The green shoots add considerable contrast*

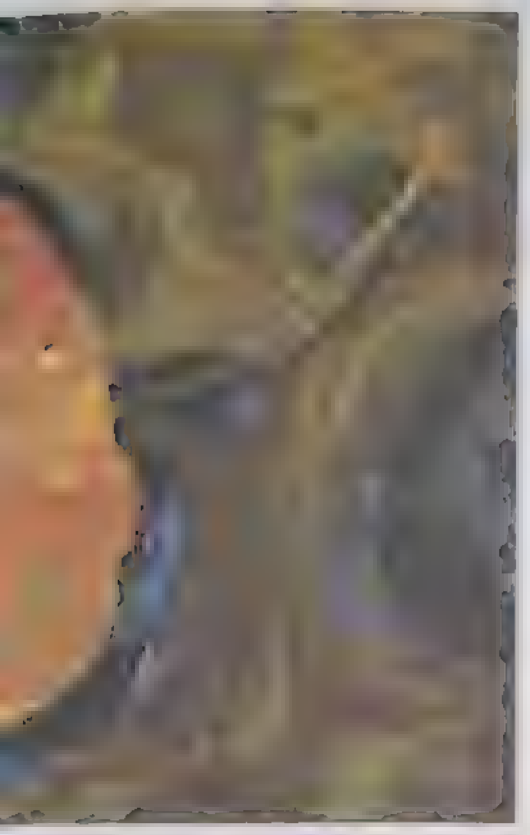
Large scale *The red tree in the foreground adds contrast to what would otherwise have been a fairly ordinary scene—the same effect as the shot above*



Forest floor

Patchwork quilt





Solo leaf *Water drops add an atm element, remu toogo by the photographer An intere tant*

Autumn elements *The lack of bright colours, the brown leaves the mi recently felled tree to the time of year*

reveal details that few people u notice f that mass of trees or an o clinging to a branch backlit t

At the opposite extreme long so offer the c unusual photograp telephoto you can close in on a distant wood—perhaps a stretch of evergreen with the odd clump of silver birch or beech trees dotted amongst them In less wooded areas, look out for groups of trees resplendent in their autumn colours which stand out from their surroundings In mountain and hill country wide angle views are improved by the inclusion of a solitary tree—perhaps a

up and autumn colours

about your approach thing a little diffe framing a single tree include a wh row and to w in fo t a focal point with a wide angle le the ground stopping down to the smallest aperture possible to include a tree or group of trees in the background A similar technique can be tried with a horse chestnut lying in the grass and children playing conkers in the background

Graphic effect *Blocks of strong colour can be made to work against one another. An added point of interest for this shot is its viewpoint from underneath the tree*

Vertical view *A very wide angle lens adds impact to the classic colour contrast of orange and blue. The photographer has also chosen to shoot into the sun*

David Hiser/The Image Bank

[illegible] of the low angle of the [illegible]

[illegible]

Close up [illegible] walks and [illegible] patterns made [illegible] leaves floating [illegible] ponds [illegible] make good subjects. Even the most modest back garden can be [illegible] subjects that are [illegible] photogenic. When isolated with a [illegible] perhaps a dead [illegible] by withered leaves [illegible] trasting darker [illegible] better for brightly [illegible] leaves. A[illegible] to ensure that the whole picture are [illegible] focus, position the camera in the same plane as the subject and use the smallest aperture you can. On windy days, leaves actually falling from the trees can also be used to create a more unusual view of the season. Experiment [illegible] speeds to render the falling leaves a mass of blur or try using fast shutter speeds or flash to freeze them in mid-air.

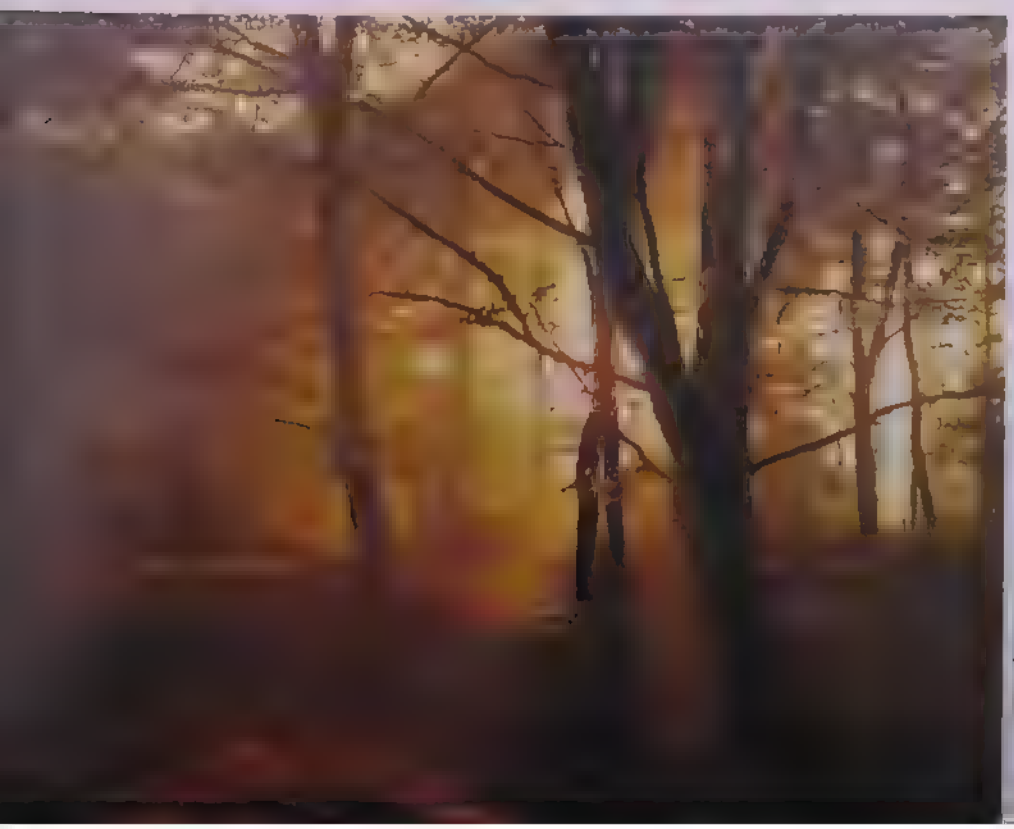
When concentrating upon rich colours and textural details, slow transparency film is usually the best choice. But for other autumn photographs you may find it effective to go completely the other way—exploiting the coarse grain of high speed transparency film such as Ektachrome 400. Low contrast, grainy film can be ideal for conveying the mood of a misty autumn day and you may find it worthwhile experimenting with similar techniques—perhaps soft focus filters or texture screens.

One of the most stimulating features this time is dewy autumn dawn. It is we

Canalside *Use of a telephoto lens emphasizes the slightly foggy atmosphere. The small area of leaves in the top right hand corner gives another seasonal clue*

Shafts of sunlight *To take such a classic view it is often necessary to shoot directly into the sun, or mist may not show*

Old fashioned look *The grainy effect of a fast film can lend a rather appealing autochrome look to pictures*



Assignment

Venice

Can an amateur take original photographs in one of the most photographed cities in the world? Dedication and careful planning paid off for office worker Michael Brooks

Blue canal [illegible]

[illegible] a simple, clear image contained plenty of information

Red hats *This school party was resting in an alley. They didn't mind me taking pictures at all. I was embarrassed when I started photographing people, but after a while you get a different frame of mind.* **Crab seller** *He was showing the crabs to a woman—who didn't buy them.* 28 mm lens

Hand in hand

Domes of St Mark's

Laundry

Super-telephotos

Almost the exclusive preserve of professionals only a few years ago, super-telephotos over 200 mm are now within the reach of many amateurs. But there are many types available so what should you look for?

[illegible] as the relative [illegible] equipment co[illegible]e and more of these [illegible] within reach of [illegible] he really long lenses [illegible]ver 600 mm—are still phenomenally [illegible] photography They are by no means restricted to the traditional telephoto roles of wildlife and sport Their main value is in bringing subjects, both near [illegible] allowing you to isolate, say, small areas of the landscape or details on the side of a building But they can be useful in other ways

Most long telephotos, for instance have extremely limited depth of field This is ideal for isolating middle distance

Long lenses *Compared with a 350 mm mirror lens (right foreground) telephoto lenses are long and bulky*

for photo

timber

Aperture

One of the

severely

than shorter lenses As the focal length (and thus magnif. tion,

so the speed of the lens

es Whereas a typical medium telephoto might have a maximum aperture of *f*/3, a 300 mm lens is as slow as *f*/4 and a 400 mm only *f*/8

Since this slow speed considerably reduces the usability of long lenses in poor light, many manufacturers produce lenses designed to give a larger maximum aperture Canon, for instance, make an *f*/2 8 400 mm lens The disadvantage is that in order to get the extra speed, these fast lenses incorporate extremely large front elements. This not only puts up the cost very considerably, but also the weight While the *f*/4 300 mm Canon weighs under one kilogram the *f*/2.8 weighs 2.3 kg. Longer fast lenses are even more massive

Even if you can afford the extra cost of a fast lens, the extra weight may also

Comparative dimensions *Two lens of 400 mm f/5.6, can differ greatly in appearance, due to such facto design, focusing mechanism and arrangement of internal componen*

smaller minimum aperture

Aperture control mechanisms also vary from lens to lens Although, most modern lenses, including telephotos, have automatic diaphragms that stop down to the set aperture as you press the shutter, a few long telephotos still have manual or *preset* aperture control In these, you must close the iris manually

Manual lenses have the disadvantages that either shots can be missed in the time it takes to close the iris, or they can be overexposed if you forget to stop down after focusing at full aperture But these are offset by the cheapness of the

Focusing

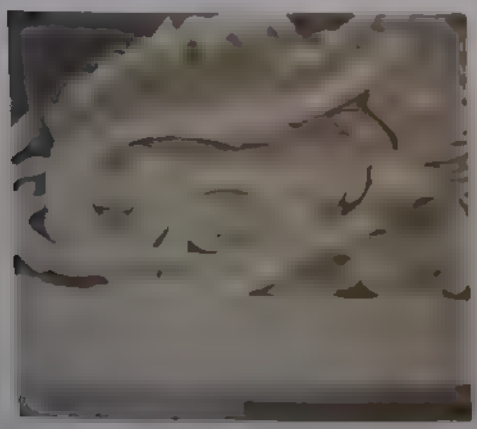
Focusing mechanisms are particularly important in telephoto lenses because of the narrow depth of field and the large movement Focusing is usually carried out in the conventional way, by turning the focusing ring on the lens barrel But there are two types of focusing mechanisms In some lenses, the optical assembly is racked out and the front of the lens moves, just as with standard length lenses Other lenses, however, at both ends of the range, are *internal focusing*, in which the overall length of the lens remains the same while

Photographs by Theo Bergstrom lenses courtesy of Minolta

200 mm lens *Magnification increases with focal length, but image area is reduced*

300 mm lens *A smaller area of the object is framed, shot from the same distance*

400 mm lens *The extreme length of these lenses makes camera shake very likely*



1000 mm lens *The powerful magnification of a super-telephoto can clearly be seen*

[illegible]

[illegible] standard lens [illegible] standard feature [illegible] which can [illegible] you to preset [illegible] after the focusing [illegible] and simply shoot back [illegible] whenever you need it. This means that you can transfer the preset [illegible] shots of the car as it [illegible] the bend and then [illegible] the preset after it has rounded the bend.

Alternatively, if rapid focusing is important, you could [illegible] equipped with a Rapid Fo[illegible] (RFF) attachment. The RFF attachment is basically a pistol-grip carriage [illegible] the lens and allows you to focus simply by squeezing the spring-loaded grip. These lenses do not have helical focusing gear and so are very simple and relatively inexpensive. They can be adapted to fit most 35 mm SLRs and have proved popular with sports photographers.

Minimum focusing distances vary greatly. For example, most 300 mm lenses can focus down to about 3.5 m but some models can focus as close as 1.4 m at which point the subject is only 3.3 times its image size on film.

This point is often overlooked when choosing a lens, but it can contribute greatly to the usefulness of a lens. A

lenses courtesy of Photax

[illegible] you can estimate in [illegible] roughly what the field of view [illegible] will be at the closest [illegible] mind that you [illegible] to reduce the [illegible] but opti[illegible] poor and you may run into [illegible] the very restricted depth [illegible]

Size and balance

Long telephotos are large and heavy, but there is a trend to [illegible] However, in order to ac[illegible] quality in their [illegible] In particular [illegible] from *pincushion* di[illegible] 6) and, if you are buying a cheap compact telephoto, it is worth checking for this. With the lens on th[illegible] the camera at a straight ver[illegible] that it is in the centre of the viewfinder. Then slowly pan the camera so that the edge moves across the viewfinder. If the lens suffers from pincushion d[illegible] the edge will bow in at the mid[illegible] comes near the edge of the frame. Repeat this check with another lens to ensure the viewfinder is not at fault.

Although compactness is clearly desirable, a heavy lens need not be unmanageable if it is properly balanced. Remember, though, that it is not the lens itself that must be balanced but the lens–camera combination. Clearly, with very big lenses, the combination's point [illegible] than the camera, so many lenses are fitted with tripod sockets [illegible]

have the tripod bush attached
the middle of the barr
camera at any angle
zontal and

Threads and mounts

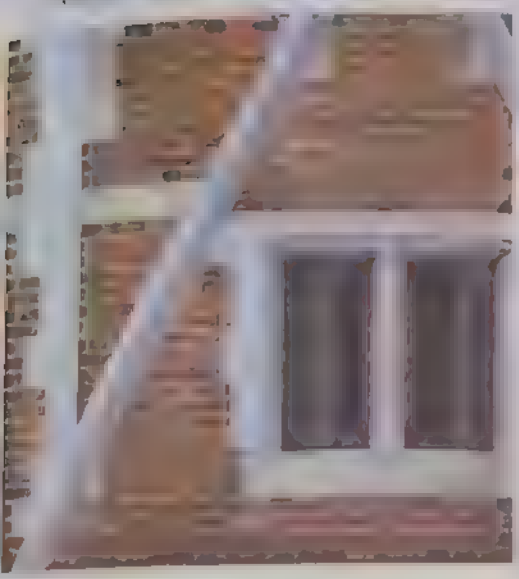


Image quality *Shots taken out of doors on a windy, hazy day by a budget (left) and a mid range (far left) 400 mm lens show only subtle differences in quality*

Typical telephotos *are usually of the external focusing type, in which the physical length of the lens varies as the barrel is rotated A lens that employs internal focusing (below centre) has several advantages, including compactness, a smooth action and a constant length*

lenses courtesy of Minolta & Vivitar

photographs by Theo Bergstrom

When light strikes film

In night photographs, the image of a bright light is often surrounded by a halo. This is just one of the effects of the scattering of light from the grains in the emulsion

Star rings *The small, intense highlight of a distant star can create an almost perfect halation ring against the dark night sky. Irradiation also softens the image of the star*

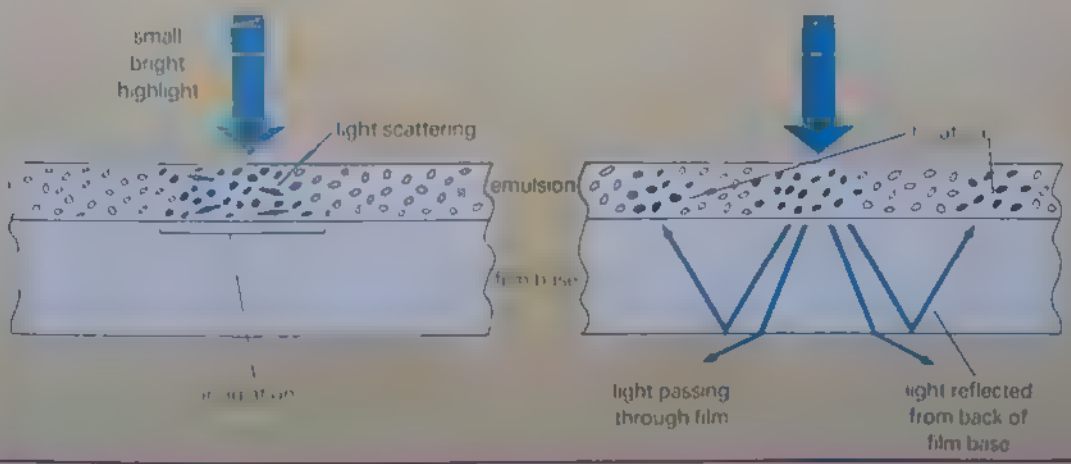
How the image of a highlight is spread out

Halation

The image of a small, bright highlight is spread out because surrounding grains are exposed by light scattered or 'irradiated' by grains in the highlight

Irradiation

When light scattered from a small highlight strikes the film base, it is reflected back into the emulsion a little way from the highlight to form a small halo image

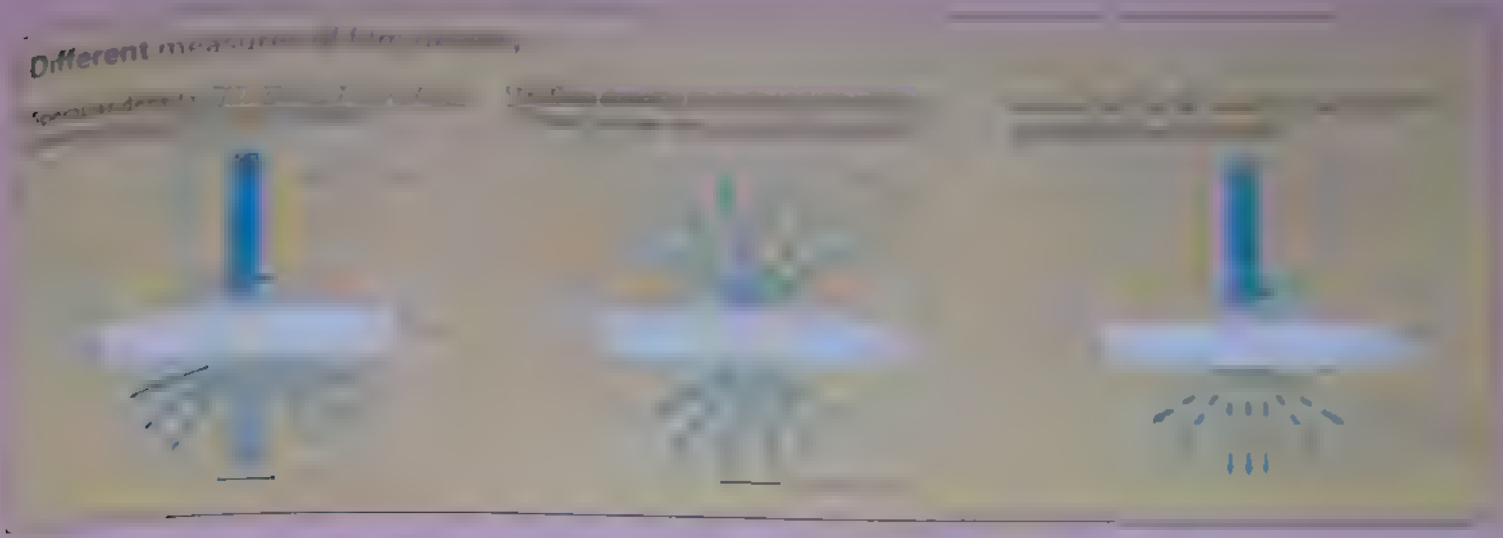


Irradiation and halation

[illegible] tered a litt[illegible] every bright s[illegible] ed through th[illegible] nd some [illegible] the grains [illegible] emulsion where it is absorbed. Because the light [illegible] at an angle, the light is reflected back into the emulsion some distance [illegible] irradiation and halation is just to diffuse the image and reduce resolution. But in subjects with small intense highlights, particularly against a dark background, halation may create a perfect ring around the image of the light. The bright halo around street lights at night or a bright star are typical of this effect.

Clearly, since both halation and irradiation are light scattering effects, they are most pronounced when light scattering within the emulsion is most severe. This

Different measures of [illegible]



[illegible] how it up but th[illegible] severe when the pic[illegible] reexposed, or [illegible] emulsion So to give a [illegible] resolution image with [illegible] minimum of irradiation [illegible] halation, you need [illegible] minimum exposure and a slow (thin-emulsion) film. Additionally, irradiation can be reduced by developing in a *surface developer* which [illegible] not penetrate deep into the emulsion, and affects only the grains near the surface.

Halation is also cut down dramatically by the use of *anti-halation backing dye*. The backing dye is meant to absorb scattered light and [illegible] it being reflected [illegible] the emulsion. It used to be simply incorporated into the gelatin *anti-curl* layer on the back of sheet and roll film. With modern 35 mm film, however it is more commonly included within the film base absorbing both light travelling towards the film base and light reflected from it.

Density

The visual image of any black and white photograph is simply varying densities of silver grains. Light is needed to make densities visible either shone through the [illegible] white paper back through the emulsion. But, just as during exposure, light is partially scattered as it is transmitted [illegible] this [illegible] effective [illegible] light [illegible] gives a [illegible] of par[illegible] lighting [illegible] other h[illegible] emulsion.

When photographic [illegible] can [illegible] *specular de[illegible] density*. To m[illegible] density, a [illegible] source is [illegible] intensity of the light transmitted is measured (with a densitometer) some distance away from the negative. The idea of measuring at a distance is to ensure that only light passing [illegible] tive is measured—taking a [illegible] itometer reading righ[illegible] up against the negative and [illegible] light [illegible] is rare. Since only [illegible] sured by [illegible] while all [illegible] th diffuse density, it is clear that with specular density, the densitometer reads less light—that is, a higher density. So specular density is always greater than diffuse density.

Hasselblad

is [illegible] because the [illegible] great deal of lig[illegible] least (a value [illegible] completely clear film. [illegible] s, you can [illegible] negative with bo[illegible] clear are[illegible] specular de[illegible] density vari[illegible] negative [illegible] density [illegible] comp[illegible] in cl[illegible] difference is [illegible] that with s[illegible] the [illegible] enhanced—an effect kn[illegible] as the *Callier effe*[illegible] number of practical results. It [illegible] instance (see page [illegible]). It is also the reason why glossy printing paper gives higher contrast than matt paper. With matt paper light is [illegible]

Broom head [illegible]

Bill Brandt

One of the most innovative of British photographers, Bill Brandt has achieved world-wide respect for the immediacy and intensity of his black and white images

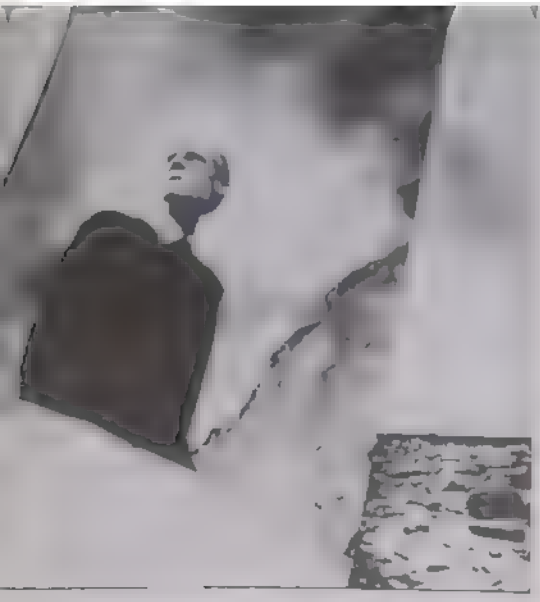
Bill Brandt, 1966 *A self-portrait taken on the East Sussex coast*

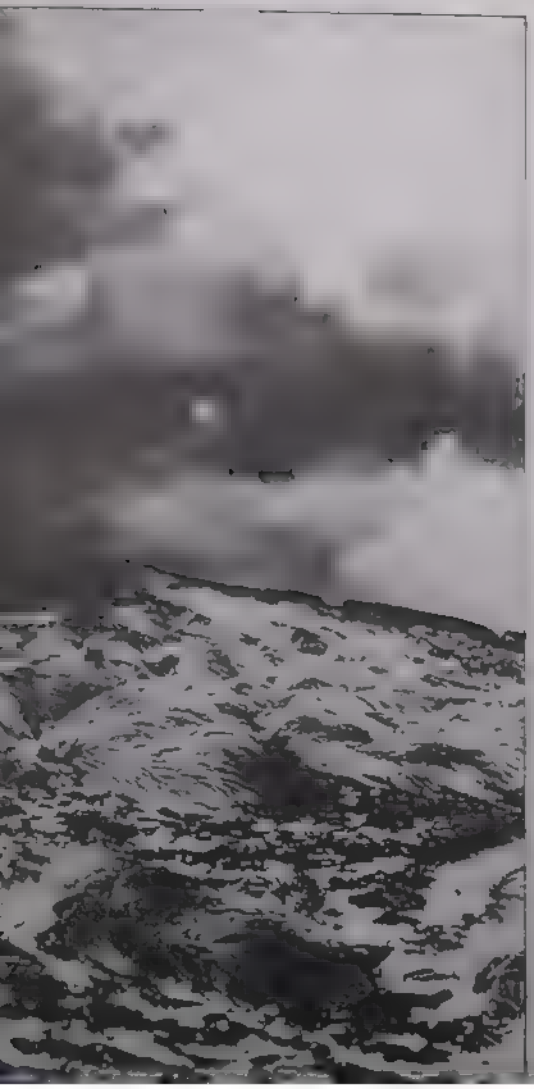
Coal-searcher, 1937, *returning after searching the tips for coal nuggets during the depression*

Halifax, 1937 *His cityscapes are enigmatic images reducing the subject to the bare essentials*

Wiltshire landscape, 1948 *Copses framed by Barbary Castle's ancient mounds*

Wuthering Heights, 1944 *A low angle emphasizes the drama of this famous spot in Yorkshire*



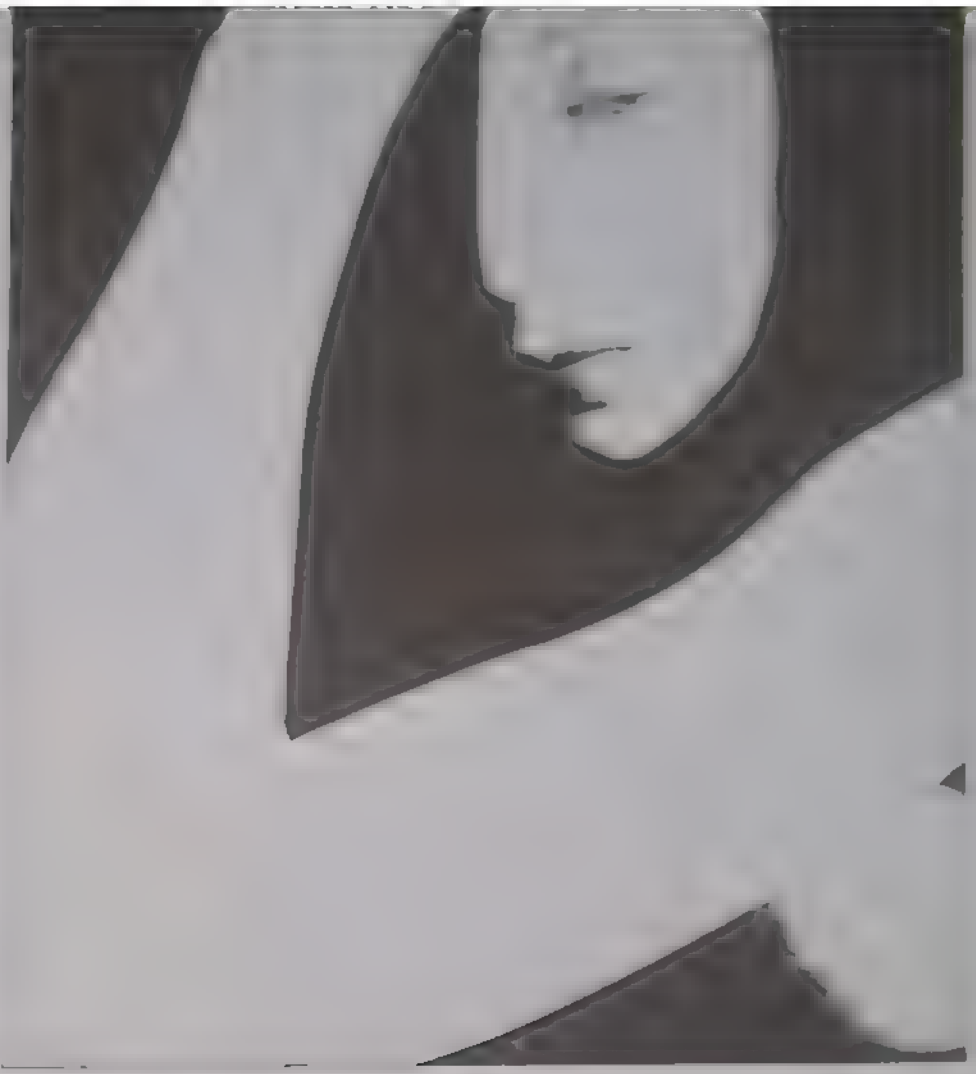


further [illegible] These [illegible] society, [illegible] differences [illegible] extremely effe[illegible] nique [illegible] Brandt later carrie[illegible] over into h[illegible] own documentary work

In 1931, Bill Brandt returned to London where he occasionally worked for the magazine *Weekly Illustrated* His first regular photojournalistic work came in 1935 when he began illustrating a weekly column written by a friend in a newspaper called the *News Chronicle*

He was also soon hard at work collect[illegible] [illegible]ok *The English* [illegible] [illegible]ed in 1936 [illegible] howed [illegible] [illegible]ulties of [illegible] [illegible]ch was totally objective, and free from personal comment This is its strength He simply shows the reader the appalling living conditions of people living in London's East End while at the same time revealing aspects of life in England's most aristocratic and wealthy households, and leaves the reader to judge for himself As Raymond Mortimer said in his introduction to the book, 'Mr Brandt shows himself to be not only an [illegible] anthropologist. H[illegible] wandered about [illegible] detached curiosity [illegible] gating the customs [illegible] unfamiliar tribe'

After the publication of this [illegible] Brandt began collecti[illegible] next book, *A Night in London* [illegible] eventually published in [illegible] shows the same marked social contra[illegible] but is shot through by a strong sense of nostalgia Brandt has said that he had a feeling at the time that much of what he was recording would not exist for muc



East Sussex Coast, 1978 *Set against the austere cliffs and rough pebbles of the beach, the woman's form takes on an even more sensuous appearance*

Portrait, London, 1952 *Like most of Brandt's nude studies this picture reduces recognizable forms to their essence, creating an element of the surreal*

Belgravia, London, 1951 *Brandt often used an extreme wide angle for his nudes, influenced by Gregg Toland's photography in Orson Welles' film 'Citizen Kane'*

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During the
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and writer
Lilliput Over the n
continued to
artists, painters
and film-makers from Brandt a
Harper's Bazaar
him to do fashi
working for *Harper's* until he

Parlourmaid running a bath, 1936
One of a series of pictures taken in the homes of the wealthy classes for the book 'The English at Home'

East End girl dancing the 'Lambeth Walk', 1939. *Brandt's photographs of the poor were not just catalogues of misery but often showed the brighter side of life in the slums*

over 70 years old.

At about the same time that Brandt began his series of portraits he also started taking landscapes and other pictures for his book *Literary Britain* published in 1951. Many of his strongest landscapes were produced at this time.

Brandt's work was continually moving in new directions. When he saw Orson Welles's classic film *Citizen Kane* in 1943 his interest in architectural photography for the National Monuments Record was rekindled. Welles had shot with wide angle lenses and specially built sets and the new look this gave to room interiors inspired Brandt with an [illegible] for photographing interiors.

The wide angle [illegible] influenced his work on the nude—the first example of his distinctive wide angle nudes appeared in *Lilliput* in 1944. Later he pursued this approach vigorously.

At first Brandt used a camera made in the early 1900s for use by auctioneers and the police. He bought it from an antique dealer for a nominal sum. The wide angle lens and pinhole sized aperture gave pin sharp detail but with amazing distortions if the subject was close to the lens.

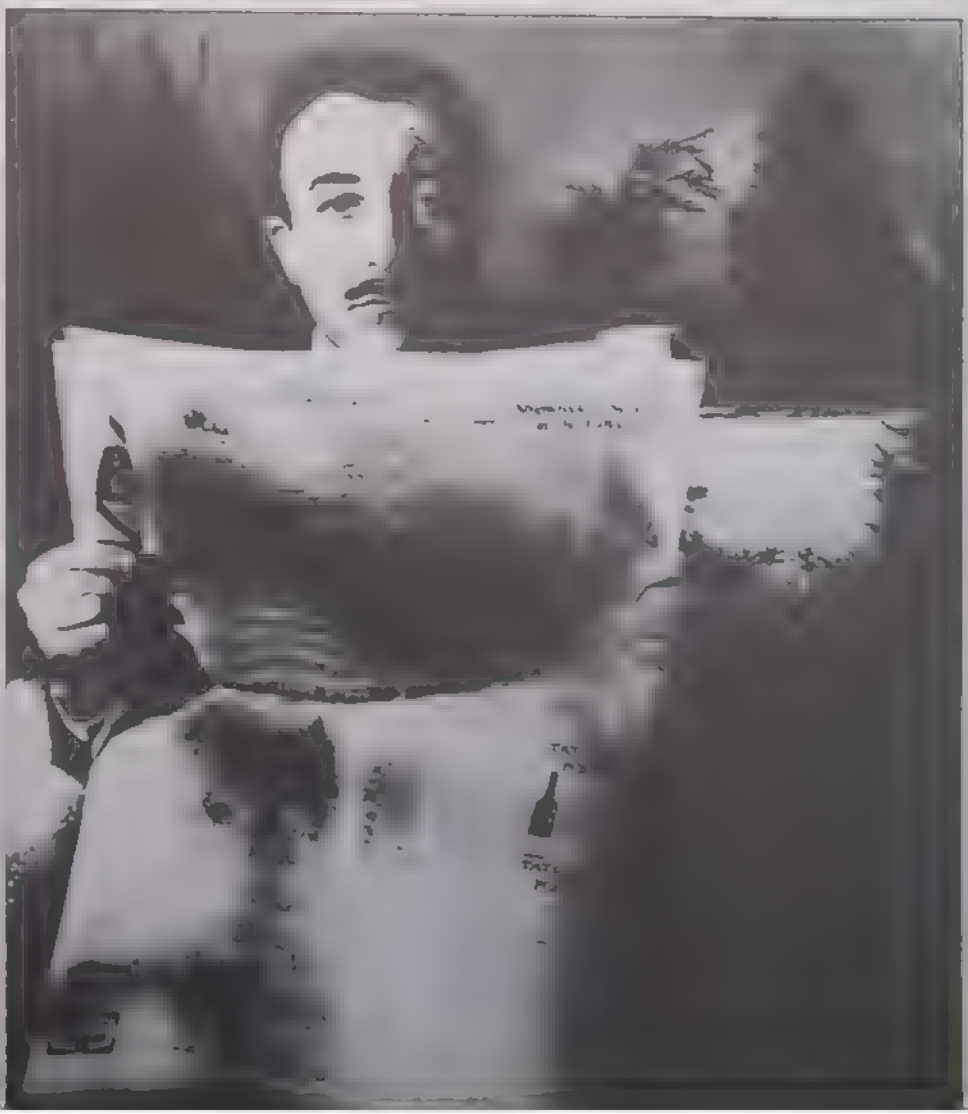
Because the image in the viewfinder of this camera was so dim, Brandt was working almost 'blind' and he suggests that his early nudes were taken not by him, but by the camera. This almost 'accidental' approach suited the rather experimental nature of his style. But as his eye developed and his ideas became more [illegible] early formed, he started to use a Hasselblad.

Just as in his portrait work, many of his nudes rely for their impact on their settings and he gradually began to take more and more of his pictures out of doors—in particular, on stony beaches.

Over the years, his nudes became more and more outrageous and disturbing. His early nudes are soft and gentle, if at times puzzling and challenging. But later they include strong elements of horror and alienation. The unnervingly claustrophobic wide angle view certainly contributes to this effect, but Brandt's increasing tendency to print to give maximum grain and stark contrast is also important.

Bill Brandt has always felt strongly that the photographer should be [illegible] involved in producing final prints. Indeed, much of his time in recent years has been taken up with producing fine prints of his most popular work. As he has said, 'I consider it essential that the photographer should do his own printing and enlarging. The final effect of the finished print depends so much on these operations. And only the photographer himself knows the effect he wants.'

Beyond this, Brandt feels that if the photographer is to know what effect he wants, he must be stimulated by his subject—he must respond to his subject positively. Significantly, Brandt seems to believe that photography is much more about 'seeing' than careful composition—providing the photographer is



[illegible] ubject first Do not try [illegible] into a picture of this, that or t[illegible] thing Stand apart from it The[illegible] thing will happen. The subject [illegible] reveal itself

Man Ray, 1970 *The Surrealist painter and photographer was Brandt's mentor at the beginning of his career in 1930's Paris*

Peter Sellers *portrayed as the epitomy of the English gentleman as he sits on a park bench reading a copy of The Times*

Improve your technique

Front and back projection

You can make your portraits and still lifes even more interesting by introducing novel or location backgrounds. And this can be done quite easily in the studio by using a projector and a screen

[illegible] behind the screen (back projection) or [illegible] front [illegible] Although you can buy sophisticated—and expensive [illegible] designed especially for back [illegible] [illegible] screen [illegible] [illegible]

[illegible] Although there are a number of different approaches, certain principles of projection apply to all the methods.

Projection principles

When using the back projection or front projection, it is important to prevent light from the studio lamps [illegible] the screen or projector [illegible] [illegible] Unless you are using [illegible] obviously non-realistic backgrounds [illegible] also important to match the [illegible] quality of the lighting on the subject [illegible] that of the background slide. This may mean using [illegible] studio lighting [illegible]

Moonlit sky *Front and back projection are most useful for producing surreal or slightly abstract pictures*

especially important if perspective
are continued or repeated in the
ground A shot looking down on a
e shot from ground leve
look right
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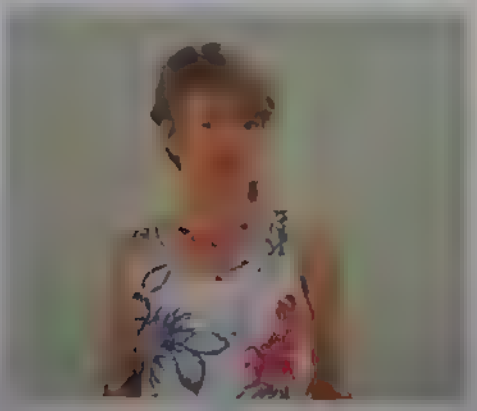
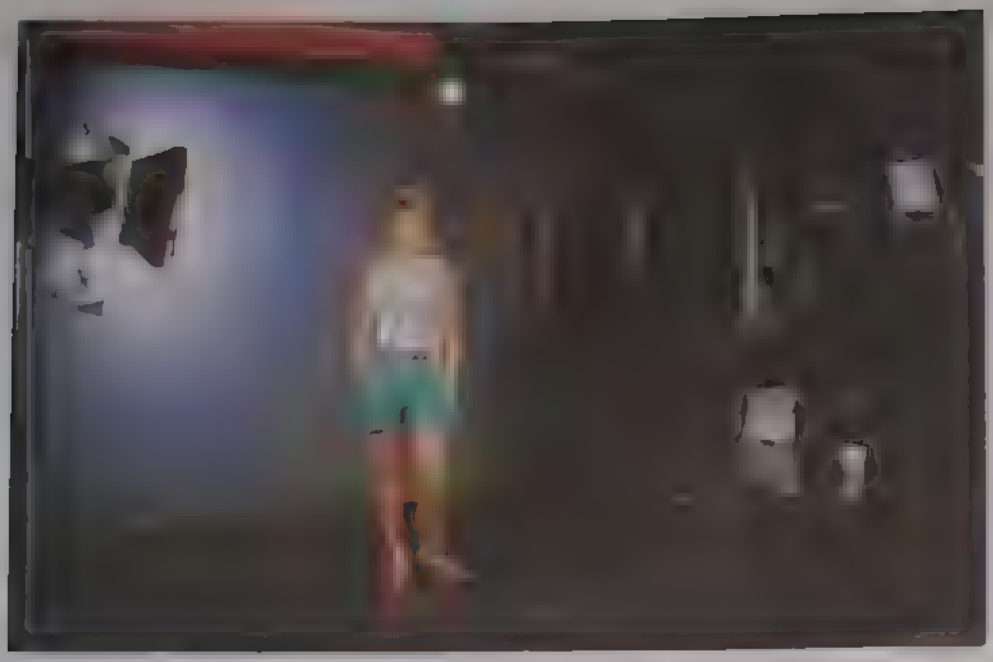
prec
t II

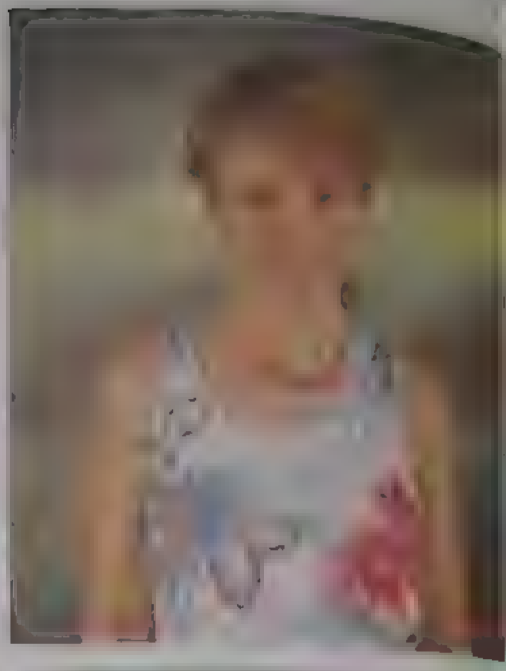
Back projection *The shots above show a basic set-up—using a standard projector and a translucent screen—and the type of result you can easily obtain*

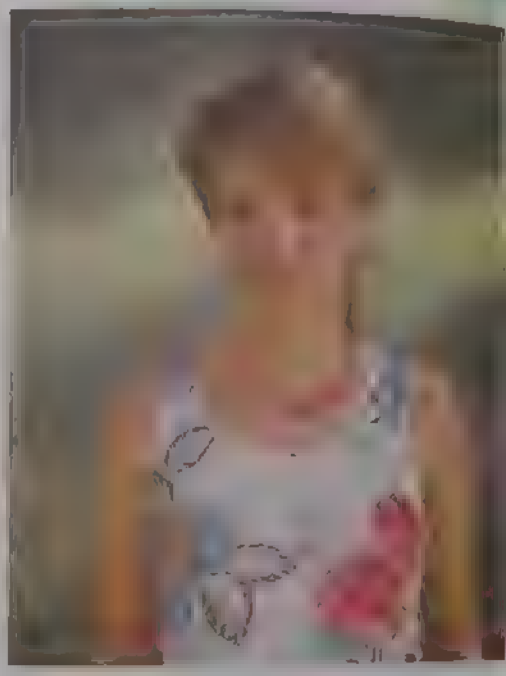
Combined images *The small shots below show the components which are combined to form the main picture Note how grey the screen is without an image on it*

Front projection









Lighting set-up *Note how the lights in the front projection set-up above are positioned and shielded to avoid light reaching the screen. Backlighting is used (bottom) to remove a black line on the shoulder (top) caused by fringing*

the projector You should [illegible] light [illegible] filtration

[illegible] one side so th[illegible] subject, otherwise [illegible] up on the subject [illegible] some distortion of [illegible] original picture m[illegible] in mind Either u[illegible] not suffer when d[illegible] [illegible] the int[illegible] A[illegible]int abstract el[illegible] between the c[illegible] small as [illegible] distortion [illegible] [illegible] with th[illegible] the dark ar[illegible] although simpl[illegible] tend to be ra[illegible]

A much more [illegible] satile system [illegible] and screen This is the type [illegible] projection used by profes[illegible] projector, which is usual[illegible] vertically upwards, throw[illegible] to a semi-silvered mirror [illegible] front of the camera lens This reflects it on to the screen and subje[illegible] 'sees' through the mirror so that the projector beam and camera view are on exactly the same axis and the shadow[illegible] cast by the subject are directly behind it and out of view

The screen used is a beaded, high gain type (see page 1815) which has a very high reflectance and a narrow reflectance angle This means that the image on the screen is very bright—much brighter than the image falling on the subject When the film is exposed for the screen, the image on the subject is very underexposed so that very little of it [illegible]

[illegible] the lights [illegible] [illegible] the screen [illegible] each side [illegible] depend [illegible]

A[illegible] [illegible] have [illegible] [illegible] as the [illegible] be [illegible] they are not the result is a black line known as *fringing*. [illegible] the subject caused by shadows [illegible] producing a cardboard cut-out effect Front projection systems which have the various components separate can take some time to set up, and accurate alignment is often difficult

Once the units are set up, they are very easy to use But to get the best out of them there are a few techniques you can use For example, it is a good idea to have your subject between one and two metres from the screen This gives enough separation to allow you to light the subject without spillage on to the screen, but without causing depth of field problems

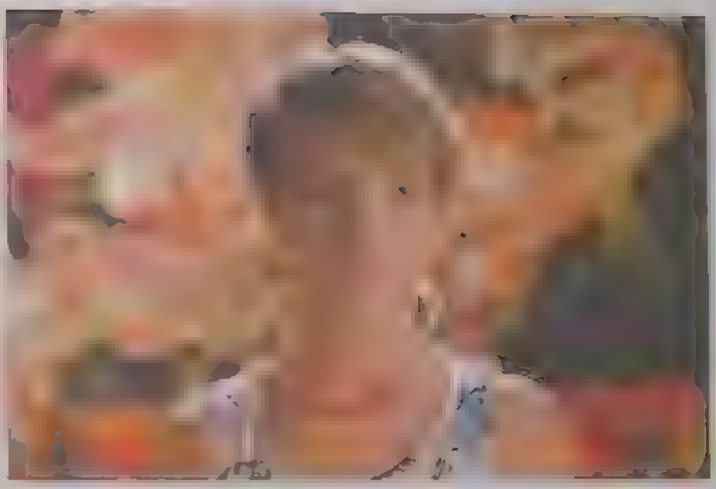
Even with properly aligned units, some fringing may occur To overcome this you should use some backlighting, [illegible] [illegible] the [illegible] [illegible] surfaces [illegible] materials [illegible] skin, slight flaring often occurs, which improves the image

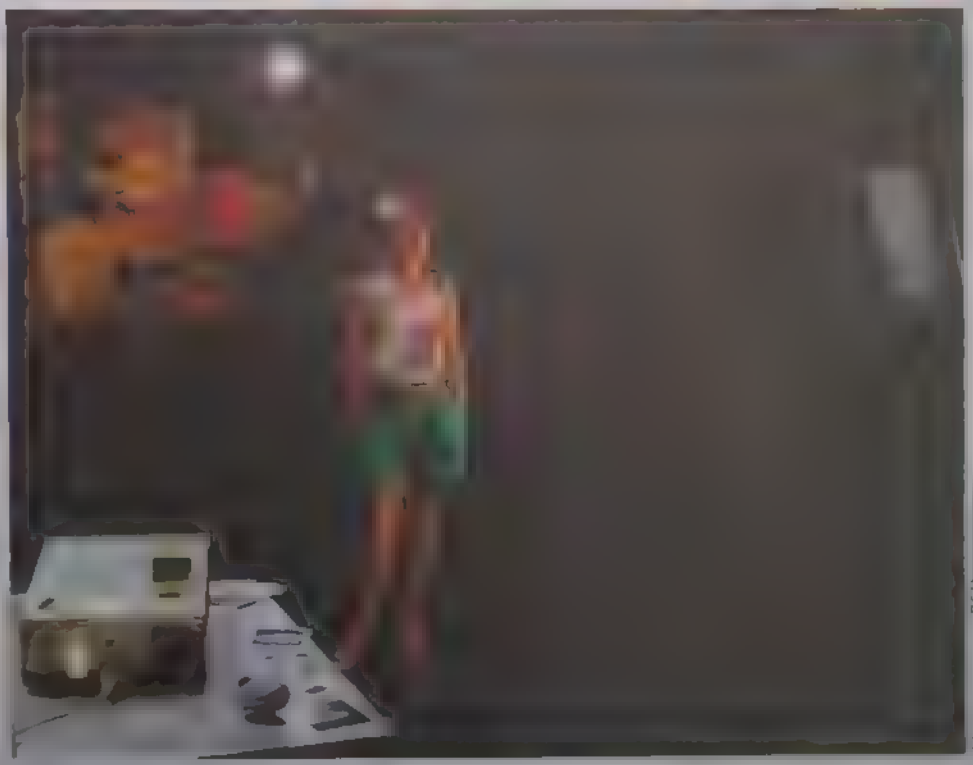
Beware of using a camera angle and composition which includes the feet of a standing person As there is no shadow coming from the feet, the effect is to make the person look as though he or she is floating

Back projection

Similar problems can occur [illegible] projection This is the technique [illegible] was widely employed in movie w[illegible] and is still sometimes used The advantage of back projection is that it produces results almost as good as those of sophisticated front projection systems, but using much cheaper equipment The disadvantage is that you need considerable space behind the screen to give a large enough image It is sometimes necessary to reflect the projector beam off a 45° mirror, or zig-zag it

Projection gear
Front projection units (left) use semi-silvered mirrors to throw the image on to the subject. To ensure correct alignment the camera lens is clamped in place. You can also get good results with simple equipment (right and below). In this case, the image was thrown on to black paper





on to a frame like a trampoline. If a full-length studio shot is set up, the floor in front of the screen may have to be built up to hide the frame.

Screens of this type can be expensive, but there are cheaper alternatives. 3M make a portable *Polacoat* twin screen unit which carries both front and rear projection screens snapped into a light-weight frame. Table top screens designed for audio-visual displays can

Bromoil printing

Oil and water do not mix, and this is the basis of bromoil printing—an old-time process, which is capable of yielding exquisitely textured images from ordinary black and white negative originals

Landscape *With its remarkable ability to combine sharpness with texture, the bromoil process offers a unique method of printing ordinary black and white negatives. Prints can be of any size, but have to be made on a suitable type of paper*

Although the clarity and contrast of modern prints is clearly a great improvement on the prints of yesteryear the soft, 'textured' images given by some old techniques can make very attractive pictures. One such method, the *bromoil process*, gives interesting, unusual pigmented prints which have a delicate and quaint appearance and character impossible to duplicate by any short-cut modern day process. Yet it is a straightforward printing technique, giving high quality 'art prints' for a minimum of expenditure. Using rollers, as here, instead of brushes for the inking stage greatly cuts the cost of materials

Just three stages are involved—exposure, bleaching and inking a black and white print And the inked image can actually be used to make transfer prints by passing the bromoil and paper sandwich through a simple press

Printing the original

For a good bromoil print, the negative should be properly exposed but slightly soft since the process tends to increase contrast If you choose a negative that is too contrasty there may be problems in the inking up stage

Special 'art' surface photographic paper without supercoating is best for making bromoils—available from specialist suppliers, such as Kentmere For various reasons, both normal fibre-based and RC paper are unsuitable

The first stage of the bromoil process is to make a print that is darker than normal—give about 20 per cent extra exposure—and leave a large border for handling. You may find it worthwhile to burn-in highlight areas such as sky details to make them reproduce in the final image. Process the print in Kodak D-163 developer at 1+5 dilution D-163 is particularly suitable as it leaves no stain in the highlights after pigmenting

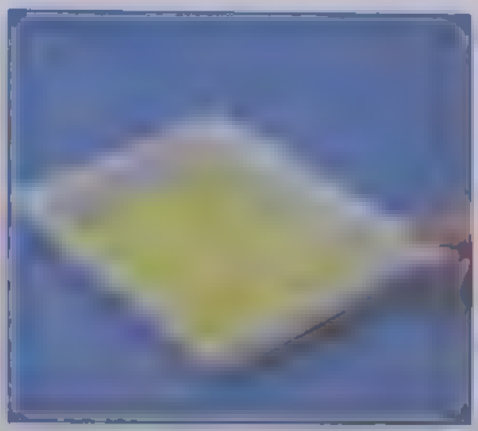
Transfer your print to a weak stop bath and then into plain non-hardening fixer for about 12 minutes. The plain fixer does not harden the gelatin Wash your print for at least one hour and then dry it thoroughly. Proper fixing and washing are vital

The bromoil sequence

Begin the bromoil sequence by soaking your print for at least ten minutes in tepid water. Next, transfer it to a tray containing a bleach-tanning solution

Making a bromoil print

1 *Begin by producing a black and white print on suitable paper. Develop this in D-163, and aim for a slightly darker than normal image. Soak the print for bromoiling*



2 *Transfer the damp print to a dish of bleach-tanning solution for ten or more minutes to allow good penetration of the chemicals and full image bleaching*

3 *Then place the bleach dish, with the print image uppermost, under a tap to wash the print clear of all traces of the yellow coloured bleach solution*

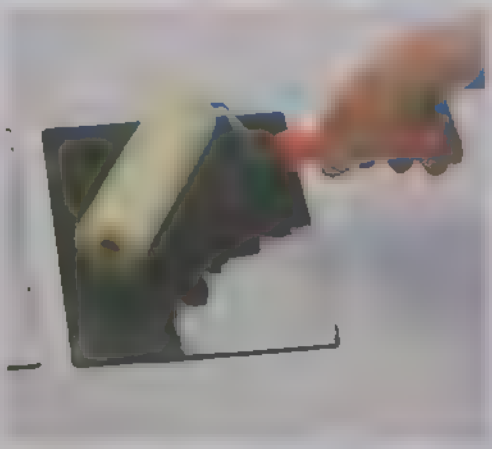
4 *After about fifteen minutes wash, immerse the print in a freshly mixed bath of plain fixer for no longer than five minutes, followed by a long wash*

5 *The pigmenting stage begins with the preparation of the inking palette—you can use a sheet of thick glass for this. Using a roller, spread the ink thinly*

6 *The bleached print—the matrix—should be stored in a dry dark place until needed for pigmenting. Then it is given a 20 minute presoak to prepare the gelatin*

continued

7 Next carefully put the matrix on a sheet of absorbent paper placed on a spare palette. Use a damp chamois leather or soft cloth to **wipe away surface droplets**



8 If you are using the roller application method, load the roller by making several passes over the inked palette. Try to make **the covering even**

9 Now pass the roller over a second but clean palette to remove or moderate the amount of ink which is subsequently **applied to the gelatin of the matrix**

13 When you are satisfied with the image, carefully pat the print surface dry and pin the edges down to prevent curling. Leave **the bromoil print to air dry**

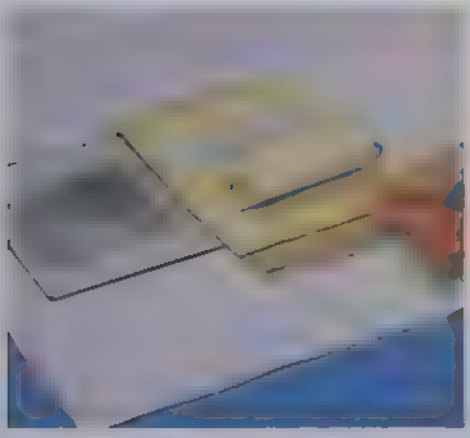
14 The original bromoil process employed brushes rather than a roller to apply pigment. These are very expensive though **excellent for the job**

15 When using a brush, several [illegible] needed. In the first, the [illegible] shaped bristles is used [illegible] with the bromoil's surface

Cleaning up

Using brushes

Bromoil transfer

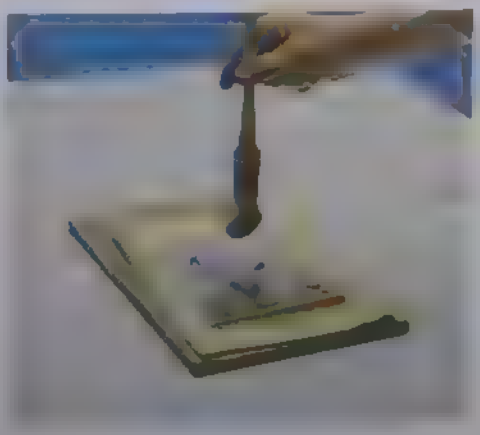


10 *Two basic actions can be used for applying pigment—a straight 'painting' motion and a 'picking' one to build up density in shadows*

11 *After the application sequence, which ends when no more pigment is wanted, transfer the print to a dish of water. Highlights can then be cleared (see text)*

12 *Use a damp cloth or chamois leather to soak the surface, and another to pat it dry, in order to remove surplus ink in highlights and on borders*

16 *In the second of the actions employed in bromoil brushwork the contact area of the brush remains the same but the brush is allowed to spring from area to area*



17 *Another technique involves allowing the brush to drop on a selected spot and be momentarily caught, on rebounding, to fall again as part of a continuous cycle*

18 *After any bromoiling sequence it is important to clean off the equipment and utensils you have used, otherwise they will be ruined by the inks*

Ideal subjects *Timeless subjects such as portraits, landscapes and pictures of buildings respond particularly well to the subtleties of the bromoil process*

with powder and linseed oil to ensure that it has a firm consistency and is not too thin it will not transfer properly and instead will spread and make a mess

Using the same sequence of actions as before for bromoil pigment and ink the matrix using the rubber roller Then lay a spare piece of transfer paper on the top and sandwich them between two pieces of card that are larger than both It is best to use smooth surface paper that has not been 'hot pressed' in manufacture otherwise it may disintegrate on application of the ink

The next stage is to run the sandwich through to ink the matrix evenly An old clothes wash wringer, or mangle, is a good substitute for the traditional bromoil transfer presses which were once made. Adjust the rollers to give uniform pressure and run the sandwich right through at a slow speed, and then back again. Do not stop midway or you may damage the matrix within. Then carefully separate the sandwich, pulling the matrix away from the transfer sheet by one corner

The matrix now has a coating of ink pressed into it and is almost ready to be used for real transfers. The image on the contact sheet gives you an indication of the result and shows areas that may need extra inking or retouching later.

Resoak the matrix in water for a minute or two as it has probably dried out. Then put it on the palette, wipe it dry and carefully ink it up again. The secret is to

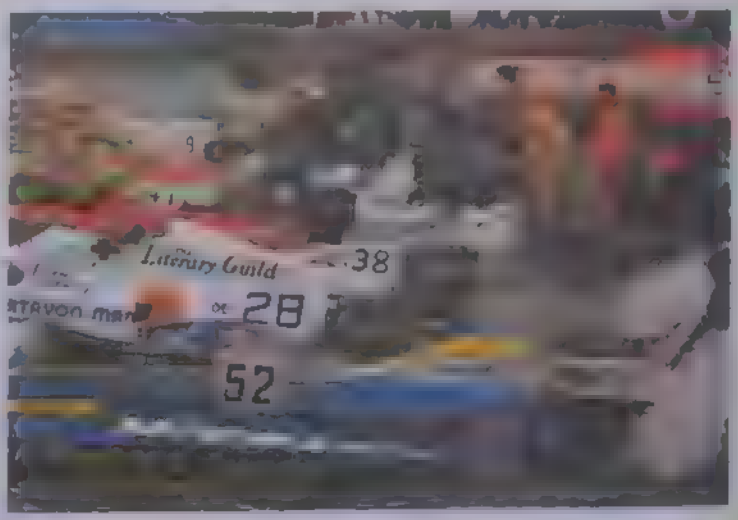
What went wrong?

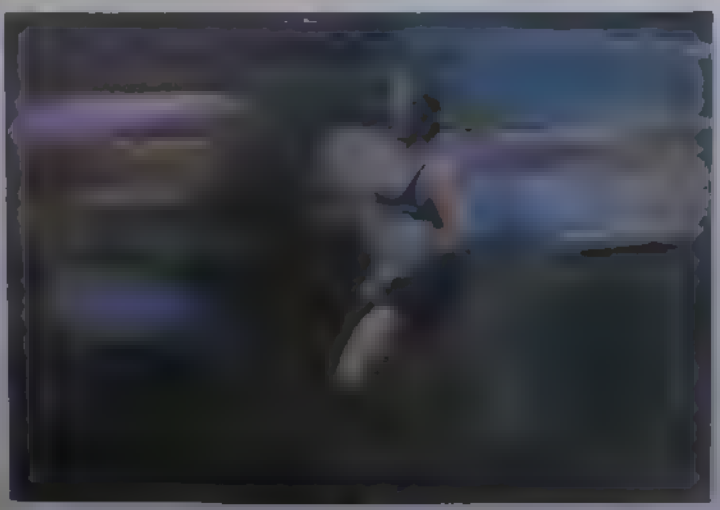
Sport

Sports photography holds some of the most exciting action material, but it is not easy to capture this on film as sports photographer Nigel Snowdon points out

Powerboat racing has long been one of my favourite subjects for sports photography, and the Grand Prix [illegible] events. There are numerous variable [illegible] but the amateur and the professional photographer can take a great variety of shots.

In this picture the photographer has made a good attempt to [illegible] the colour and excitement of the start of a race. The [illegible] exposed but one now seems to lack a main focal point and the [illegible] points of interest—the drivers, the [illegible] and the helpers—are [illegible] separated. I feel that had the photographer shot a fraction after the boats would have been in a more interesting attitude with the propellers biting deeper into the water sending showers of spray over the helpers and thus drawing the separate elements of the picture closer together and creating more impact. As it is, the engine of the second boat is barely turning over. Perhaps a lens of a slightly shorter focal length or a more distant viewpoint that enabled the front [illegible] of at least one boat to be included in the picture might have improved the composition.





There are several ways in which a photographer can shoot athletics straightforward reportage type pictures—the athlete breasting the tape, the differing styles of athletes, the look of triumph or despair on an athlete's face and so on—or there is the impressionistic approach where the action seems to leap out of the page. To do this, a zoom lens could be used to zoom during the exposure or perhaps, as this photographer has done, use a very slow shutter speed to give the impression of great speed.

I feel that in this picture, however, that the slow shutter has been slightly overdone. A faster shutter speed might have made the body and face of the runner slightly sharper while still allowing sufficient movement in the arms and legs to achieve the feeling of speed although there is always an element of 'hit and miss' in this type of shot. I think that the feet of the runner are an important part of the picture and should not have been cut off. Although the background colours are attractive, the overall effect is rather drab for such an animated subject.


ERAF
40.35E

Anne Hickmott

Gum dichromate printing

This interesting and inexpensive process—whereby gum, pigment and dichromate are coated on paper—can be used to print quaint period 'art' photographs like those made at the turn of the century

Like many old printing processes, gum dichromate printing is worth reviving if you are looking for something a little out of the ordinary in the darkroom. It is a simple, cheap and, above all, highly attractive way of making coloured prints

Formerly known as bichromate printing, gum dichromate works by contact printing rather than enlarging, and the essence of the process is that gum, mixed with potassium dichromate, is coated on paper and hardened by exposure to very bright light If you add a suitable pigment to the gum dichromate mixture expose the print to a continuous tone or high contrast negative image then wash away unexposed unhardened image areas to develop the image the result is a coloured positive which has a soft pastel appearance not unlike a chalk drawing

You can use tinted papers for the base and virtually any colour or combination of colours for the print It is possible to add areas of colour selectively to image areas, by recoating and re-exposing

Pub window *This is the same posterization as used for the step-by-step sequence shown overleaf, but different printing colours have been used. The materials needed for gum dichromate printing, shown below, are relatively cheap*

Tim Stephens

The paper base

You can coat the gum mixture on to any good quality paper support—in fact on to almost any grease-free prepared surface But the texture of the paper greatly influences the nature and quality of the final image. So you should choose the paper to give the kind of finish you want A smooth surfaced paper gives the finest detail, while a rough textured surface gives an 'original' look Choose as tough a paper as possible because this stands handling in the wet state and dry without buckling. Very [illegible] may be used but they [illegible] sizing—preparation [illegible] prevent [illegible] pigment and [illegible] different papers [illegible]

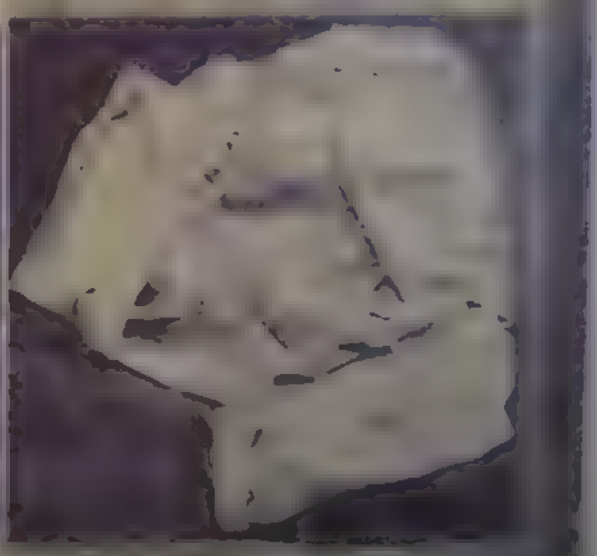
Preparing the paper

Mixing the emulsion

Classic nude *Early example of a gum dichromate print, made around 1900. The process was particularly popular in Europe, and Demachy was one of its principal exponents (see page 1504).* **Hand colouring** *Gum dichromate prints can be coloured by hand using retouching dyes, watercolour or gouache pigments after the printing procedure has been completed*

[illegible] lamp black burnt un[illegible] and venetian red are [illegible] Always use the best quality [illegible] as you can afford as the [illegible] impurities—remember, a little can go a long way

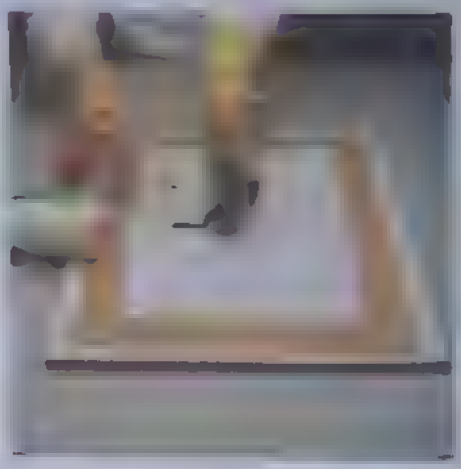
Prepare the emulsion [illegible] subdued [illegible] Mix equal parts [illegible] the gum and [illegible] every four parts [illegible] pigment. A [illegible] solution with a [illegible] pigment should be [illegible] A4 prints. The [illegible] has to be established by trial [illegible] is usually simpler to mix the pigm[illegible] with the dichromate solution first [illegible] ing until it is uniform. Then [illegible] until this too is thoroughly mixe[illegible] be dismayed by the yell[illegible]



Making a gum dichromate print

1 *Gum dichromate mixture can be used on any good quality paper. If it is likely to stretch, prestretch it by soaking it in hot water and pin it down*

2 *Tape the damp paper to a workboard using gumstrip. Leave the paper to dry. Use a hairdryer to speed drying. Then size the paper using any household spray starch*



3 *Mix up the mucilage by adding gum arabic to a premix of 10% dichromate solution and pigment of your choice. Then pour a little on to the print paper*

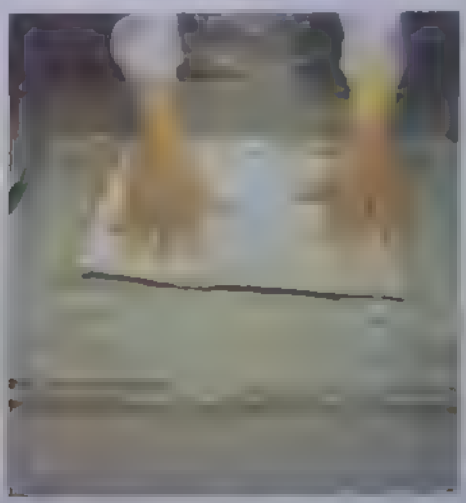
4 *Spread the coloured mucilage evenly. A roller gives the most even coating but suitable brushes may be used to obtain a brushwork textured effect*

5 *When the gum mixture has dried, position the separation negative you are using for the first colour or image in contact with the prepared paper, and tape it down*

6 *To 'print' the border, use an opaque mask cut from a sheet of thick cartridge paper. Finally, weigh down the sandwich with a sheet of clean glass*

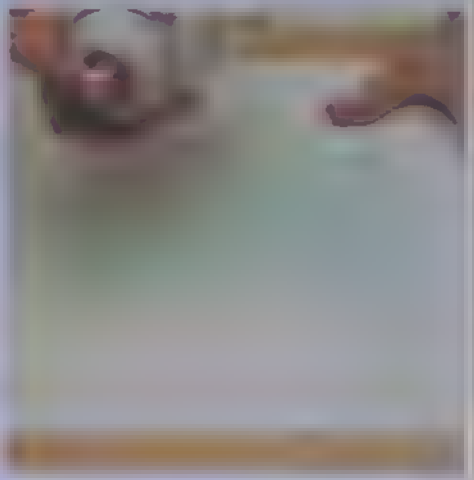
7 *Use an adjustable lamp fitted with a bulb high in UV output to make the fairly long exposure. The duration can be found by making test prints, noting lamp height*

8 *Carefully dismantle the exposure sandwich. Some sort of latent image should be visible if the exposure has been made correctly and for the right time*



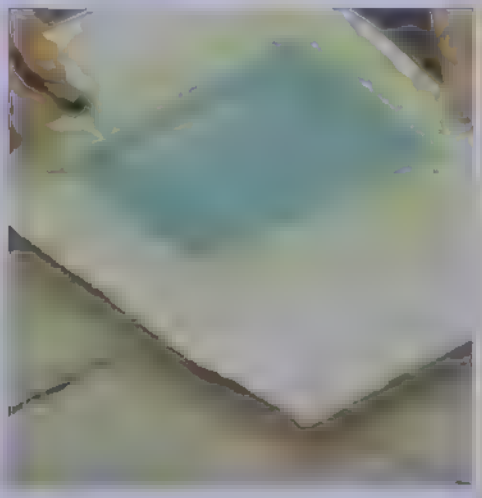
9 *Soak the paper in a dish of fairly cool water, face downwards, for about ten minutes. Carefully remove the gumstrip, and handle the print only by its edges*

10 *Carefully turn the print face upwards. Unexposed, and thus unhardened, parts of the image should have begun to wash clear but stubborn areas can be gently hosed*



11 *Dry the print. If another colour, tone or image is to be added, the paper must be sized again and recoated on each occasion, then taped to a workboard as before*

12 *Position and tape down the second image separation registering the two images as you go. Complete the sandwich as before and make the next exposure*



13 *Develop the image as before, hosing down gently if necessary. Warmer water and gentle brushing can be used to encourage the removal of obstinate parts*

Tim Stephens

14 *Here, a third colour has been added. The same separation can be used for printing a completely different set of colours—such as for the lead picture (page 2201)*

15 *Finally, immerse the print in the 'fix' solution which consists of a 5% solution of sodium metabisulphite. This removes the yellow dichromate stain. Then dry the print*

dichromate, which may overpower the pigment colour, as this will disappear after processing. This emulsion, known as *mucilage* (a solution of gum), does not keep and should not be stored, so only prepare as much as you need.

Coating the paper

Coating is a critical part of the process and you must be extremely careful to ensure that the coat is [illegible] thick. For the most [illegible] apply the mucilage using a latex foam roller. Spraying and brushing are other [illegible] particularly attractive as they [illegible] integral part of the image. You do not have to coat the paper in the darkroom, you can work almost anywhere out of direct sunlight, since the coating is not fully sensitized until dry.

If you use a roller, 'ink' it up with the mucilage by placing a small amount on a sheet of glass or plastic, and running the roller over it. If necessary, thin the mucilage load by running the roller over another sheet of glass or plastic. Then coat the sized paper—rolling as thinly and as evenly as possible. Leave the paper to dry in dim light.

For brushwork, it is best to use a 60 mm wide brush, adopting a criss-cross stroke pattern. Brush marks can be accentuated using a slightly narrower and stiffer brush. If you do not want the textured appearance this gives, go over it again with a dry roller. If you do want brush marks or textures, apply the mixture unevenly, taking care that the coating is not too thick—otherwise the image could float off when developed.

Once the paper is coated it should be dried in a dark room or cupboard and exposed as soon as possible after drying. A fan heater or hair dryer can be used to speed up the process. But avoid over heating or the print may be fogged.

Exposing the print

You can expose the sensitized paper when it is dry. Contact printing methods are used, so you will need large size negatives, an exposing light and a printing frame—or a heavy sheet of glass and a sponge backing.

Ideally the negative should have a fair amount of contrast—a line original is ideal. Printing in different colours using line separations suitable for posterization is very effective. Enlargement copies made from colour transparencies and panchromatic or separation negative film also give excellent results.

To make an exposure, simply place the gum dichromate paper firmly in contact with the negative, emulsion to emulsion and expose this sandwich to a very bright light. Although you can make use of bright, indirect sunlight, the variable intensity of sunlight makes exposures unpredictable. Direct sunlight produces flat results. Use a UV [illegible] QI lamp (Quartz Iodine) [illegible] a projector so that lamp [illegible] and exposure times can be noted and used as the basis for similar exposures in the

Susan De Bu

Needleworker *The structure of the image is considerably influenced by the choice of paper used for the gum dichromate print. Fine textured handmade paper was used here as well as a precoated base of white gouache, or watercolour*

future. A lamp rig or stand is useful.

Exposure times vary according to the light source, the coating thickness of the mucilage, the pigment used and the base material (paper) structure. If you are as consistent as possible with all preparation stages, it is possible to have some rough idea of the exposure to stage future tests—but do take notes of all your experiments. As a guide, a UV lamp of 125 watts held a metre above the sandwich would have to be switched on for about 15 minutes to make an exposure.

During exposure the image 'prints out', becoming visible. When all the highlight detail is clear, exposure is complete. By carefully peeling back one corner of the sandwich in a contact printer, you may be able to check the course of exposure from time to time—but you need an old-type hinged frame for this.

If several exposures are to be made on the same print, it is necessary to have some form of registration so that all exposures will be in the correct position. A simple method is to indicate the image area by pencil marks on the handling borders of the print—just align each image with these. A commercial punch register system is best but a home-made version may prove adequate. Alternatively, register the images visually.

Development

Development should be carried out immediately after exposure and may be done in subdued daylight or roomlight. Wash the print in several changes of water at room temperature and then leave it floating face down in a dish of water. Inspect the print after about ten minutes, taking great care to handle the print by its edges only—avoid touching the surface at all costs. If the exposure is correct, the unexposed and so unhardened gum in the highlight areas should wash clear. A small, soft brush can be used to encourage these to clear. Place the print face up on an upright sheet of glass or plastic and very gently spray it with cold water until the full tonal range appears and no further pigment drains off. Development is then complete.

Complete development may take several hours unless encouraged by hosing down—but it all depends on the density you require. If the print is too light, it is underexposed. If it is too dense, the exposure has been too long. Sometimes the use of warm—but not hot—water will help to remove and clear dense prints. Leave the print to dry by hanging it up, or lay it flat on blotting paper. Do not touch the surface of the print while it remains wet.

'Fixing'

At this stage the print still has a residue of yellow dichromate stain and this can be cleared by immersing it in a five per cent solution of sodium metabisulphite. Do not use ordinary fixer solution.

Finally, wash the print in running cold water for a few minutes and pin it on to a board to dry.

Multiple exposures

It is usual to size, coat, expose and develop several times to achieve darker tones or adequate shadow detail—or to add a different image or colour. This means you can use the thinnest possible coating, to stop the pigment washing away during the development washing stage. Five printings for a darkly toned image are not unusual. The second and subsequent exposures must be shorter so that only shadow detail is exposed. As a result, the first exposure appears rather flat and lacking in contrast.

It may seem that the process is extremely lengthy when compared to other forms of printing. But several prints can be made at the same time, some being exposed or processed, others dried.

Special effects

As the mucilage is applied by brush or roller and usually covers a larger area than the negative, the print will have an extended border. If this is not required, a black paper mask should be cut out to the correct size and placed around the negatives during exposure.

Local modifications of tones are possible during the development by brushing or spraying selected areas only. Stiff paint brushes will scratch the pigment—an effect only desirable if it is intended. Localized areas of colour can be laid on and given separate exposures. Finally, small blemishes can be corrected by careful spotting techniques using the mucilage you have prepared.

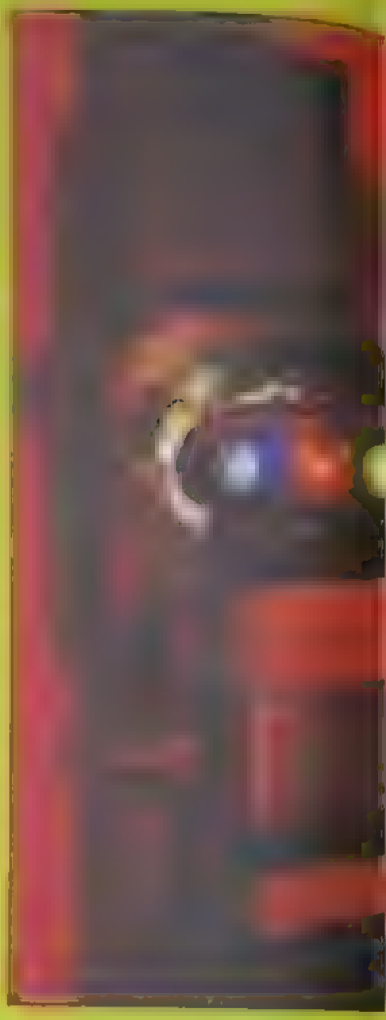
Anne Hickmott

Anne Hickmott

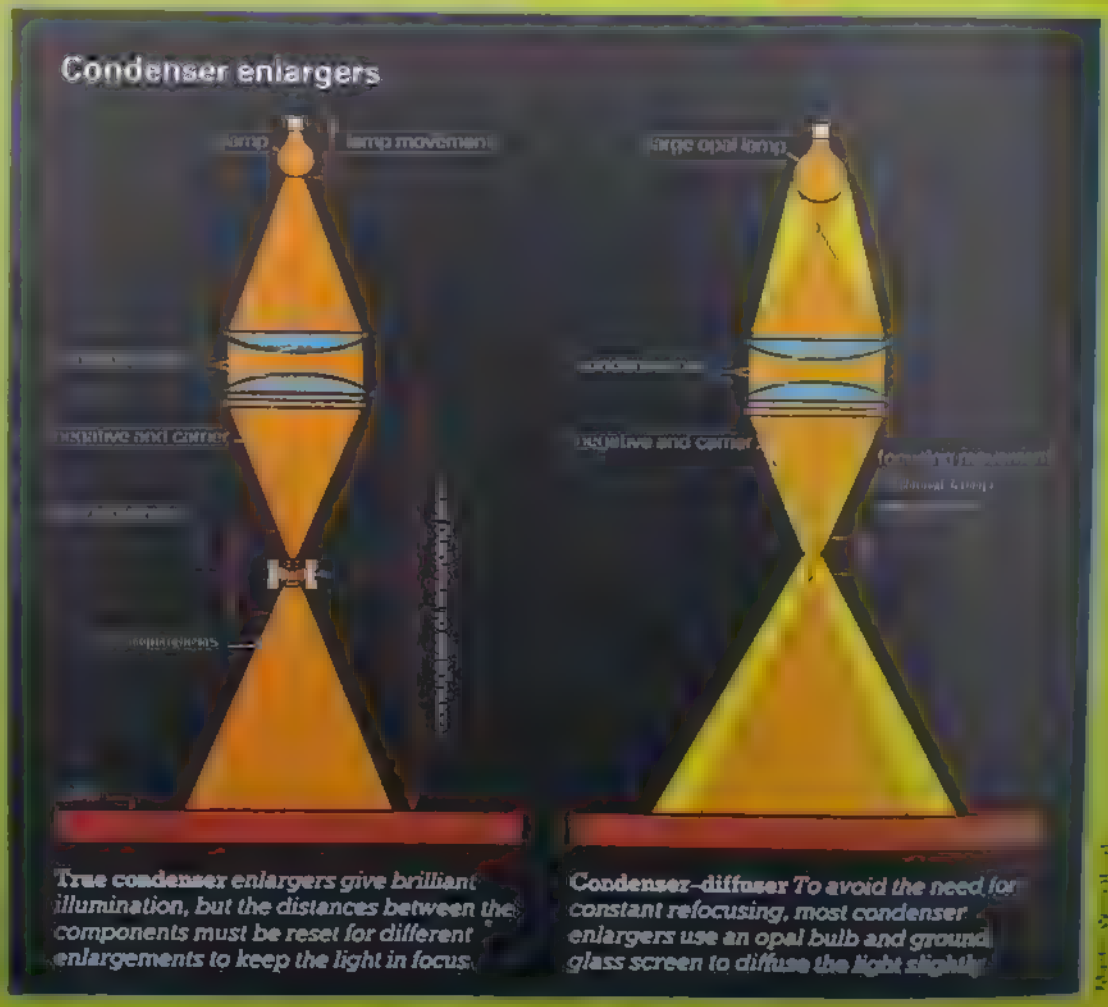
Street *Fine detail can be preserved. This gum dichromate print was exposed to a tone-line negative.*
Chairs *The abstract effect is considerably heightened by using coarse textured handmade paper. The original was a colour slide*

Enlarger light sources

The light source in an enlarger is much more than just a light bulb. To give the bright, even illumination needed for perfectly exposed prints, the light must be either focused precisely or properly diffused—or both



Diffuser enlargers



True condenser *enlargers give brilliant illumination, but the distances between the components must be reset for different enlargements to keep the light in focus*

Condenser–diffuser *To avoid the need for constant refocusing, most condenser enlargers use an opal bulb and ground glass screen to diffuse the light slightly*

Enlarger light sources *have become more and more sophisticated over the years but even colour enlargers work on the same basic principles*

Condenser–diffusers

Simple diffuser *Although exposures are long, a diffuse light source never needs refocusing and does not show up heavy retouching marks or other blemishes*

Cold cathode tube *enlarger give a diffuse light bright enough for big enlargements but do not overheat as a conventional bulb might*

Equipment file

Big cats

The increase in popularity of mirror lenses over recent years owes much to reductions in their size and cost, bringing within the scope of the amateur those exotic wildlife and sports shots that previously only professionals could take

By Toldi

Catadioptric—that
number of glass refra

Compactness *and low cost are the main advantages of modern mirror lenses. The large lens, here, is a reflecting telescope—these work well as 'mirror' lenses.* **Long and short** *The difference in length of a 400 mm telephoto and a 400 mm mirror lens is very significant*

Weight and cost savings

Aperture

Theo Bergstrom, lenses courtesy of

number varies with the focal le[illegible] mm mirrors are often f/5.6, whi[illegible] mirrors are usually f/8 and 1000 [illegible] mirrors f/11. Zeiss make a pair of fast[illegible] lenses—a 500 mm f/4.5 and a 1000 mm f/5.6—but these are incredibly expensive, the 1000 mm costing more than a luxury sports car.

Because of the fixed aperture [illegible] sure must be controlled largely [illegible] varying the shutter speed. While [illegible] priority cameras will still w[illegible] matically with a mirror lens fitted, aperture priority cameras must be operated manually. Normally, you have no choice over shutter speed: it is dictated by the lighting conditions. You can alter exposure by using neutral density filters to reduce the effective aperture. Most mirror lenses come with a pair of neutral density filters, but if they are not supplied, ND filters for a lens which only accepts giant front-mounted filters may almost cancel the saving.

The fixed aperture is a significant disadvantage in many respects. Most importantly, perhaps, mirrors are very slow lenses. Indeed, the central obstruction blocks out some of the light passing through the lens and means that the effective aperture is actually up to a full stop less than the nominal rating.

This reduces the usability of the lens significantly. With a nominal aperture of f/8 and an effective aperture of f/[illegible] a 5[illegible] mm mirror must be used with a fairly slow shutter speed in all but the brightest conditions. This means that you will very rarely be able to hand hold a 500 mm mirror—even in bright sunshine you need fast 400 ASA (ISO) film to allow the 1/1000 second necessary for hand holding. The mirror's portability becomes less important when you have to carry a full-size tripod around all the time to support it properly.

The slow speed of the mirror also means that the focusing screen is very [illegible] image for [illegible] at ap[illegible] you can fit a ground glass focusing screen to your camera you may find it [illegible] the [illegible] even [illegible] less depth of field than a telep[illegible] is because [illegible] results in a d[illegible] 30 [illegible] which is actually a [illegible] ately the eye can detect an [illegible] focusing easier than [illegible]

A number of mirror lenses are now being marketed with special close focusing ability. Indeed most mirror lenses can focus closer than a comparable telephoto. The 4[illegible] mm Sigma for instance focuses down to as close as two metres to frame an area only [illegible] metres wide. But at this distance the depth of field is extremely limited, probably little more than [illegible] rarely be able to take advantage of the close focusing ability. The only advantage of the mirror's limited depth of field is that it compensates to a small degree for the darkness of the image when focusing. The image snaps in and out of focus more noticeably.

Optics

Optically, the big advantage of mirror lenses is their freedom from chromatic and spherical aberration (see page 926). Long telephotos must incorporate bulky and expensive correcting elements. Unfortunately, this advantage is outweighed in other respects.

First of all, because of the ring like [illegible] telephotos illu[illegible]

With good quality mirror [illegible]

Telescope mirrors

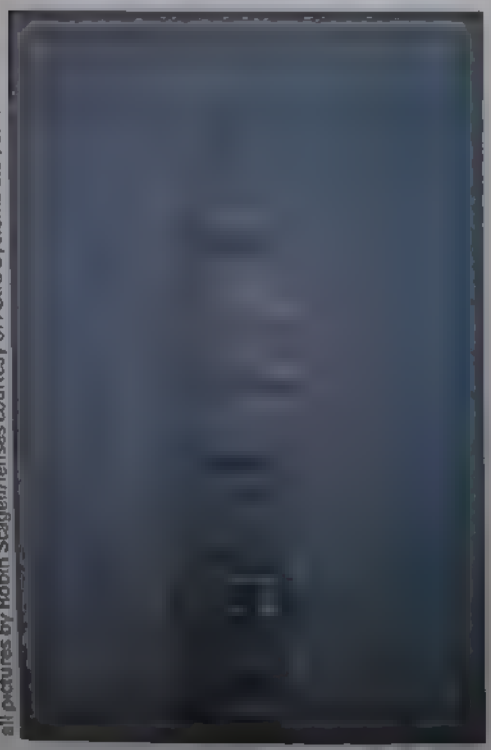
[illegible] demand for such telescopes is [illegible] high [illegible] mass production [illegible] costs down.

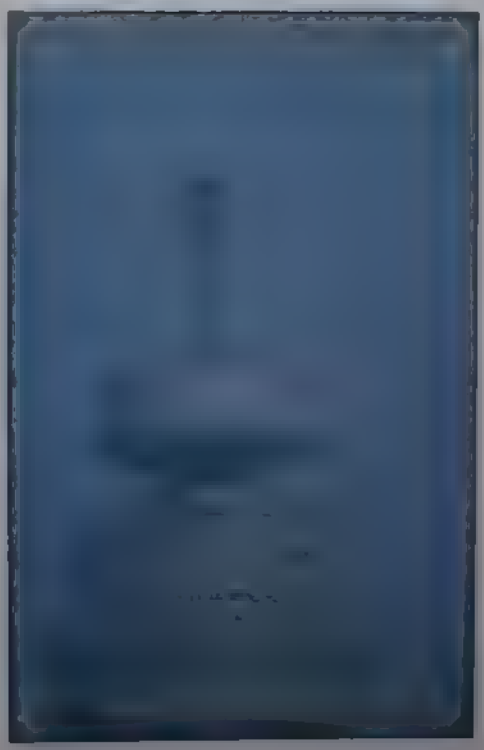
An image which is [illegible] an eyepiece at high power must be of very [illegible] quality, and a good telescope is more than adequate [illegible] In addition, you can attach [illegible] of purpose designed accessories to [illegible] the telescope by day or [illegible] The best [illegible] invariably use [illegible] which [illegible] virtually any make of camera [illegible]

Conclusions

Mirror lenses of up to [illegible] mm [illegible] length have applications in [illegible] photography and are compact enough to be carried around when you might leave the equivalent refracting lens at home, though the mirror lens quality is noticeably worse.

Above 5[illegible] mm mirror lenses [illegible] into their own, but the difficulty [illegible] them tends to make them worthwhile only if you have a specific use in mind. However, as prices steadily drop many more amateurs may find a use for them.





all pictures by Robin Scagell/lenses courtesy of Astro Systems Ltd., Luton

Three Celestron lens [illegible] of Astro Systems [illegible]

Extra long focus *The 2000 mm Celestron 8 is a relatively inexpensive astronomical telescope through which details of the moon and planets or even distant nebulae can be viewed with outstanding clarity and at reasonable magnification. Fitted to a 35 mm SLR via a T-adapter and an inverter, to erect the image, such a set-up can be used for astrononomical as well as terrestrial subjects, such as wildlife, sports and architectural details*

Typical focal lengths *Mirror lenses are available most commonly in focal lengths of 300, 500, 1000 and 2000 mm. The greatest choice is offered in 500 mm, whereas there are remarkably few in intermediate focal lengths, such as 400 mm. The shots from left to right were taken from the same rooftop location on a hot, hazy day, using a 350 mm mirror lens and telescopes of 750, 1000, 1250 and 2000 mm focal length. For all these shots the use of a tripod was essential as even locating the subject is difficult when hand-holding the bigger models. The 2000 mm telescope gave fair results, despite unavoidable vibration*

Fritz von der Schulenburg

Attention to lighting and detail coupled with an enormous enthusiasm for his work have given Fritz von der Schulenburg the chance to travel on assignment photographing interiors and exteriors all over the world

Photographing interiors may sound rather a dull activity—until you meet the London-based German photographer Fritz von der Schulenburg. Immediately you are struck by the way he throws himself into his work. Indeed, it is impossible not to get carried away by his enthusiasm and his evident delight in showing his photographs.

Von der Schulenburg's love of photography started when he was given a Brownie camera for his sixth birthday. But for many years his passion was largely a hobby—for 16 years after leaving college in Munich he worked as an art director in advertising.

As an art director, von der Schulenburg worked in a number of places, but the period that he most enjoyed was working for the advertising agency, Collett, Dickinson and Pearce in England. 'CDP was a very revolutionary agency and was, in those days, the most creative agency in Europe. It did all the Benson and Hedges' cigarette adverts—really remarkable work.'

Naturally he came into constant contact with photographers while working in advertising and, from time to time, he directed photographers of the calibre of Avedon, Donovan and Duffy. The experience was invaluable to him, both technically and visually.

Rambagh Palace Hotel, India *Shot at dusk using a long exposure to capture both the sunset and the warm glow of the lights*

During his time as an art director he continued to take photographs and often sold his work to magazines. Eventually his passion for photography overtook him and he decided to work as a freelance art director so that he could spend more time doing freelance photographic jobs. At first, these were largely in advertising but in the end he decided that his real interest lay outside advertising and in editorial photography.

Making the change from advertising to editorial photography involved a great deal of hard work for little reward, but after two years he had gained the recognition he sought—and the interesting commissions.

Nowadays most of von der Schulenburg's work is confined to interiors and exteriors and over 70 per cent of it is editorial photography. However, he still does some advertising work. This is usually studio photography—like photographing a new range of kitchen furniture. However, although this is definitely the more lucrative end of the market he still prefers the freedom of editorial photography where he has far more scope to create a particular mood.

Nevertheless, his experience in advertising is undoubtedly valuable in helping him to successfully assess and dress an interior—adding the little details that create the right atmosphere. Sometimes it is simply a question of placing a glass of Martini in the right spot or adding flowers. At other times, von der Schulenburg must create an environment almost from scratch. For example, while on assignment to photograph a palace in India, he discovered a marvellous railway carriage—a relic of the time of the British Raj—lined with mellow wood panels. But the furniture was out of place. By carefully rearranging the seats and covering them with rugs von der Schulenburg created a suitable nostalgic mood.

It is always the little unnoticed details that are the key to a successful interior shot. 'On location you often have to vacuum carpets, pick fluff from sheepskin rugs and polish furniture. If there is a fire in the room, it should be lit. If it's a dining room you light the candles and

At the regatta

Jodpur hunting lodge *Von der Schulenburg found this fabulous relic empty and 'dressed' it for the photographs*

Fritz von der Schulenburg Interiors

These two pictures were taken for the British design magazine 'Interiors' for a story on the home of writer Robert Lacey **Exterior** *(top) To create this warm atmospheric shot, Von der Schulenburg waited until dusk and used a long exposure so that he could show the warm glow from the windows and sky* **Interior** *Von der Schulenburg took this view of the Lacey's living room from its upper gallery using one of his favourite wide angle lenses to include the whole room. As usual, he paid particular attention to detail, carefully arranging the flowers and objects to provide a good balance within the picture*

Fritz von der Schulenburg Interiors


CIRCUS
PUBLICITY

Senora Cagiati *A portrait of the Italian ambassador's wife at home in London for the magazine—'The Lady Diplomat'*

with rich gold light. Autumn leaves litter the pavement while inside heavy green ferns [illegible] their colour balance. There is a [illegible] depth which extends from [illegible] metres to over 6 metres. Basically I had to [illegible]

Scotch whisky *Taken for the annual report of the Distiller's Group at dusk in front of the Forth Bridge near Edinburgh*

the time. I gave [illegible] Paris a Norman [illegible] way between day and night. I used tungsten [illegible] the [illegible] warm light on the pavement. I then [illegible] expose [illegible] the [illegible] and a [illegible] Fundersprüenjeuch.

Van der Schulenburg uses Ac flash systems. American Norman 2[illegible] B units and modified Bacar window units which are large diffuser units contain [illegible] model lamps (see page 20). The advantage of the Normans is that they are lightweight and small enough to be [illegible] behind furniture.

The Normans are [illegible] fashion photographers [illegible] unusual for people [illegible] interiors. But they [illegible] be invaluable [illegible] locations far from power [illegible] they charged these units [illegible] flashes of 2[illegible] joules each. [illegible] flash heads of the Norman [illegible] by slave units. Their diffuser [illegible] to define the edge [illegible] flowers and the effect [illegible] is to draw the eye into the [illegible] Without this extra light [illegible] look flat.

However when he [illegible] a large ceiling he [illegible] metre Bacar [illegible] supply 500[illegible] joules [illegible] the room is very important [illegible] der Schulenburg [illegible] Normans won't give e[illegible] use big window lights or [illegible] are, literally, one big [illegible] bounce the light off the ceiling.

Although he generally us[illegible] chrome 64 daylight film, [illegible] Schulenburg also uses E[illegible] balanced for tungsten [illegible] light in a room [illegible] the effect is a pleasing cool atmosphere with odd items bathed in warm pools of light. By increasing exposure times he can effectively warm the mood by degrees from cold to medium cool [illegible]

very short exposure where the flash has done all the lighting gives a blue cast he explains 'A 1/15 second is just enough to give the tungsten light a chance to come into the picture Expose for two seconds and see what happens

As many of von [illegible] assignments are on location abroad mobility is crucial He travels w[illegible] strong aluminium [illegible] packs three Nikons—two F2s and a manual FM The Nikons [illegible] motordrives and his lenses include an ultra wide 18 mm which he uses carefully to divert attention from distortion He likes the 35 mm camera for recording detail, but it cannot compete with a 6 × 9 camera in capturing the full lighting range in an interior To make the most of the smaller format, he uses Kodachrome rather than Ektachrome

His favourite camera is a 6 × 9 Mamiya Universal which he had modified to make it as light as possible. The viewfinder was completely removed by an engineer and von der Schulenburg composes his shots with the aid of a viewing screen set in the back of the camera. This screen must be removed before the camera can be loaded and the exposure made Von der Schulenburg also built in a spirit level—something essential in interior shots. The result is a versatile, light weight large format camera which can be used easily on location

He often uses the Mamiya with a very wide angle 50 mm lens with a Compur leaf shutter, but he also uses other [illegible] them exclusively Even when on an [illegible] grounds

Occasionally von der Schulenburg may add a graduated filter while shooting outside, just to bring the eye away from the sky and down towards the roof The problem of converging verticals which occurs with wide angle lenses does not bother him—none of his cameras have a rising front and he does not own a perspective correcting lens 'I think verticals must be vertical in an interior, but if you want to show the height of the ceiling, it's not always possible to make corrections so I accentuate it instead. I really go over the top, moving in close to the wall and shooting upwards

Besides photographing a building and its contents von der Schulenburg may take portraits of some of the people associated with the building For instance, when he was assigned to cover the sale of the contents of Hever Castle in England, he photographed the butler and an old gardener who had been working there for many years and his portraits convey the sadness of the occasion

[illegible] photo[illegible] Agent as [illegible] the shadows are [illegible] always bowed as he passed them on his way out of the door

The shots he took that day also included a study of a dog in its [illegible] grounds and many details of individual pieces of armour and of [illegible] like this bring life to individual stories and provide the variety necessary [illegible]

When talking about any of [illegible] assignments von der Schulenburg's enthusiasm is continuously infectious Each new assignment and location is for him, a fantastic adventure from which he returns laden with images It is his enthusiasm combined with an attention to the needs of his story that [illegible] constant demand for the [illegible] brings to his work [illegible] marvellous profession', he [illegible] very difficult to get into, but once you [illegible] the financial rewards are relatively unimportant compared to the [illegible] satisfaction you can get from it

Relic of wealth *The former Maharajah of Jodpur's private railway carriage—now rented out for luxury tours of India*

Fritz von der Schulenburg

Testing cameras & lenses

It is infuriating to take a good shot only to discover later that the picture has been ruined by faulty equipment. So it is worth checking your equipment occasionally to make sure that no major faults have developed

Stephen J Krasemann (DRK Photo)

[illegible] simply to [illegible] performs

Lens resolution

You can test the resolution of your lens by taking a series of pictures of a test target and analyzing the results. Various test targets can be used, depending on how detailed you want results to be, but whatever test target you choose, you must do everything possible to eliminate any causes of unsharpness that are due to poor technique

It is important to mount the camera on a tripod and use a cable release to keep

the chances of vibration to a minimum. The camera must be a [illegible] with the target with the [illegible] to it and the film plane parallel [illegible] target (see page 944)

If you simply want to test your lens and no other part of the image system then you should use the finest grain film available. Ideal films are Kodak Panatomic-X and Ilford Pan F (both monochrome), or Kodachrome 25 (for colour [illegible]). However, it is often more [illegible]ful to [illegible] the resolution of the [illegible] film and developer combination which you normally use. If the tests give sharp results with this combination, then any lack of sharpness is probably the result of poor camera technique or fault [illegible] focusing system. Also, you should test the lens at every aperture setting.

For a general indication of the sharpness of your lens, try photographing a brick wall—preferably one with a rough texture—at a distance of 7 to 30 m. It should be evenly illuminated and the air must be clear. You can examine the processed pictures to check for clear rendition of both high [illegible] contrast detail at the various apertures and across the field of view.

Frozen moose *It is essential that the fast speeds in your camera are accurate if you are to be sure of freezing motion, such as the water drops in this picture*

Turntable test *This method can be used to test the slower speeds on leaf shutters. Place a mark on the edge of a turntable, measure the distance of the mark from the centre, and then photograph it. The mark records as a blur—the examples below show speeds of 1/8 and 1/60 second—and the length of the blur is used to find the exact shutter speed given by the camera*

Using a test chart

[illegible] tapped to a wall. These charts are meant [illegible]

[illegible] usually oc[illegible] resolution are bad [illegible] processing. To find out [illegible] the problems y[illegible] with different lens [illegible] and development [illegible] it is worth making sure that [illegible] system of your camera [illegible]

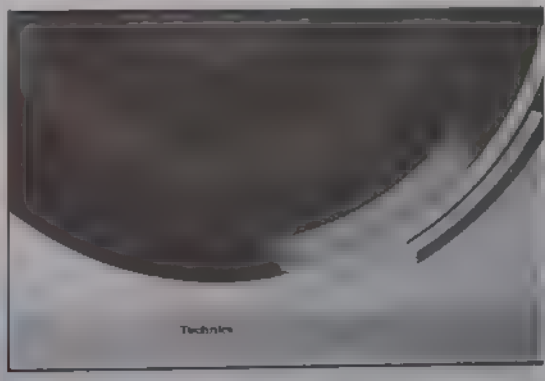
Focusing tests

Focusing accuracy is easily tested using a clearly numbered ruler. Set this at an angle of 30° to 45° to the lens axis, and [illegible] and take a pa[illegible] [illegible] be performed with the lens at f[illegible] [illegible] disguised by the depth of field at [illegible] [illegible] see if the [illegible]

Distortion

[illegible] distortion using the [illegible] chart and composing the picture so [illegible] straight edge of the chart is very [illegible] to the edge of the frame. If the edge of the chart appears to bow outwards in the picture then there is barrel distortion [illegible] inwards then the lens [illegible] distortion. To [illegible] a print from the [illegible] and check the straight line [illegible] ruler, assuming that your enlarger [illegible] prints.

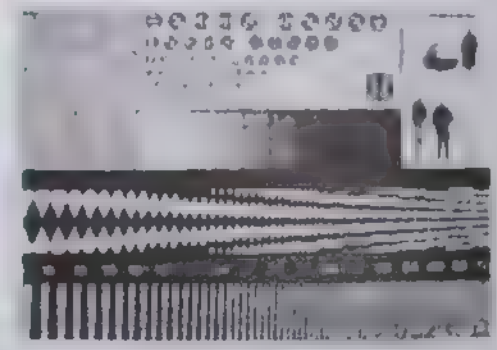
[illegible] lens does have distortion, there is little you can do about it. Fortunately, providing it is only slight, distortion is usually unnoticeable unless your picture includes straight lines, such as the side of a building, or a door or open window near the edge of the frame.

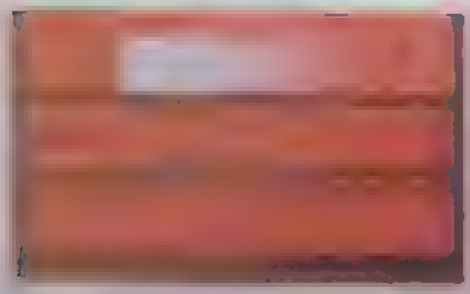


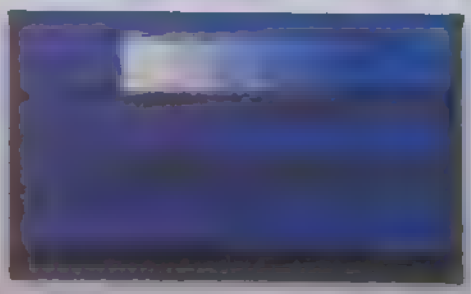
Dave King

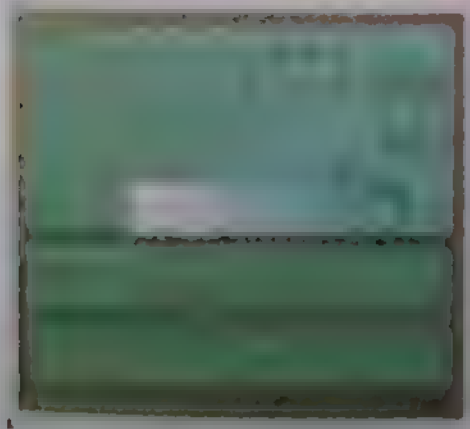
Dave King

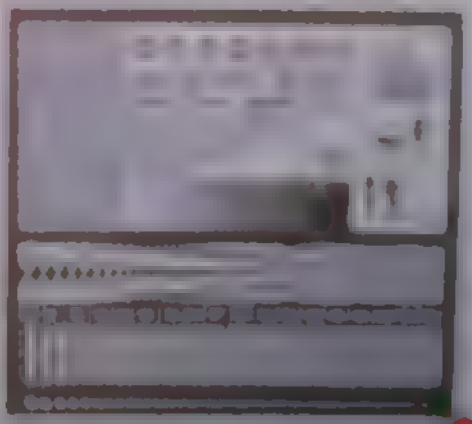
Chart testing *The resolution charts are arranged as shown in the picture (left) in order to test both the centre and the corners of the lens's field of view. The enlargements below show the results of shooting the chart. In the color shots, different apertures were used. The large picture, which was shot at f/11 displays higher resolution than the other, shot at f/1.8. The black and white shot was also taken at f/11 with the same lens, but it has higher resolution than the large colour picture due to better resolving power in the film*











Dave King

Shutter testing

The shutter of a camera is not as easy to test as the lens. For complete accuracy manufacturers use expensive and sophisticated equipment. However, there are some basic tests which you can do to check that your shutter speeds are at least close to the speed set—although they only work accurately for a small range of shutter speeds

With the focal plane shutters found on most SLRs, you can check some speeds using a standard television set. With speeds faster than 1/30 second only part

Setting up *To test the resolving [illegible] pin or tape a test chart to a flat wall or board. The [illegible] then be placed a set distance from the chart (with this chart it is 40 × the focal length of the lens). For best results it is important that the illumination is even across the chart, and thus can be checked with a lightmeter*

of the screen image is recorded (see pages 1841 to 1845). The number of lines which are recorded depends on the shutter speed used so by photographing the TV and counting the lines photographed successfully it is possible to calculate the shutter speed.

With the room blacked out (to avoid reflections) turn up the brightness of the TV set and mount the camera on a tripod. Using a fast film (to allow fast shutter speeds) photograph the TV image at all speeds from 1/30 second upwards. Cameras with horizontally run shutters should be used horizontally, and those with vertical shutters should be set for vertical (upright) framing. This is so that in both cases the shutter is running horizontally relative to the television.

Once again you must examine the processed pictures using a magnifier. Carefully count the lines on the TV image, but only include the bright ones—any faint lines are likely to be the 'afterglow' from a previous scan. From the number of lines it is possible, using the formula given (see box) to work out the actual shutter speed.

The dark area of the TV screen as seen on the pictures is usually a diagonal strip. You may notice that the width of this strip varies slightly across the screen. This is due to [illegible] the shutter bands during [illegible] for the same reason [illegible] always count the lines in the centre of the TV image. Also as [illegible] TV screen image are made up of the three sets of dots or lines (see page 184), which can be confusing and difficult to examine it is better to [illegible] the TV set.

Leaf shutters can also be tested by this method. Indeed counting the lines is much easier with leaf shutters since the dark band is horizontal. But you can test the slow speeds on leaf shutters as well by using a record player turntable. To do this, place a bright mark such as a small white or yellow sticker right at the edge of the turntable. Then with the turntable revolving, photograph it at various speeds. The mark records on the film as a blur, and from the length of the blur you can deduce the shutter speed. Unfortun-

a [illegible]
(strob[illegible]

Mount the came[illegible] above the turntal[illegible] marked [illegible] table and m[illegible] in the pictures. The sut[illegible] [illegible] prints [illegible] pictures [illegible]

To work out the [illegible] speed you must work out [illegible] main travels in the [illegible] Measure [illegible] the circumference of the turntable (assuming that the least [illegible] the mark [illegible] the very edge). At [illegible] revolutions per [illegible] the distance moved in one second is three-quarters of the circumference. For example, if a turntable with a [illegible] of 30 cm, the mark travels [illegible] second. Next measure the total length of the blur on the print and [illegible] length of the mark to find the actual movement involved and divide the result by the distance travelled in one second. This gives the shutter speed. In our example the blur is 3.9 cm and the mark is 1 cm wide, then the shutter speed is 2.9 divided by [illegible] giving 2.46 — virtually 1/[illegible] second.

Focus test *To check the focusing system, one mark is focused on and photographed, and the negative is viewed to see if the same mark is still sharp*

TV shutter test

Calculating the shutter speed is done by counting the number of bright lines that can be seen in the photograph, and then using the formula below. This calculation is based on the number of lines employed by the TV system you are using, and the time taken for one complete scan. For example, in the UK 625 lines are used with a scan rate of 1/25 second.

$$\text{shutter speed} = \frac{1}{(L/C) \times S}$$

where L = number of lines used by the system

C = number of lines counted in the photograph

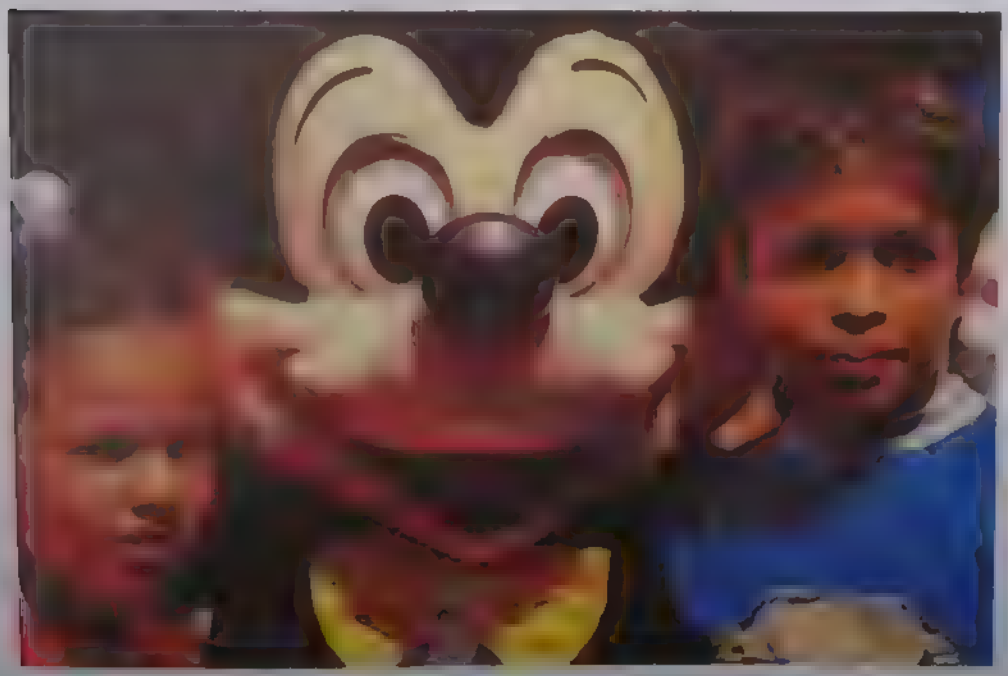
S = scan time

If, for example, you can count 312 lines on a British (PAL) set, this indicates a shutter speed of 1 (625 ÷ 312) × 25 or approximately 1/50 second.

Dave King/camera courtesy of Bronica

Disneyland

The 'Magic Kingdom' is a world of frivolity for people of all ages to enjoy. Sergio Dorantes spent some time there and has captured the basic elements—the fantasy and the people



Mickey Mouse and friends *No photo assignment on Disneyland would be complete without a portrait of the famous cartoon character*

New Orleans Square *Many parts of Disneyland make picturesque shots. Extra interest has been added with the double bass*

Mickey Mice *Small details like this add strong clues to the feel and essence of a place—here, it is tourism*

Flying elephants *Sergio has used his wide angle lens to achieve a striking graphic effect in this picture. The shadows are a strong element of the composition*

Very young ladies *This trio seem to be sharing a private joke. This shot clearly expresses the mood of a day at Disneyland*

Balloon seller *Using his 20 mm lens, Sergio filled the upper half of the frame with colourful balloons. The staff at Disneyland are always happy to be photographed*

Series and themes

Photographs that form a series on a particular theme can mean much more than any of the individual pictures—and they can make a good long term project. There is a vast range of subjects suitable for pictures on a theme

When [illegible] complete series of pictures on a common theme may be far more telling than any of the individual shots.

One of the main advantages of looking for series of pictures rather than individual shots is that it frees you from the tendency to include a great deal of information in each photograph. If you know you will cover other aspects of the subject in subsequent shots, you can make the image simple and all the more effective. Then you begin to look for interesting details that might otherwise go unnoticed or unappreciated. Some subjects might simply not work in isolation—a photograph of a single door, for instance, might be uninteresting, but a whole series of photographs could make a fascinating study.

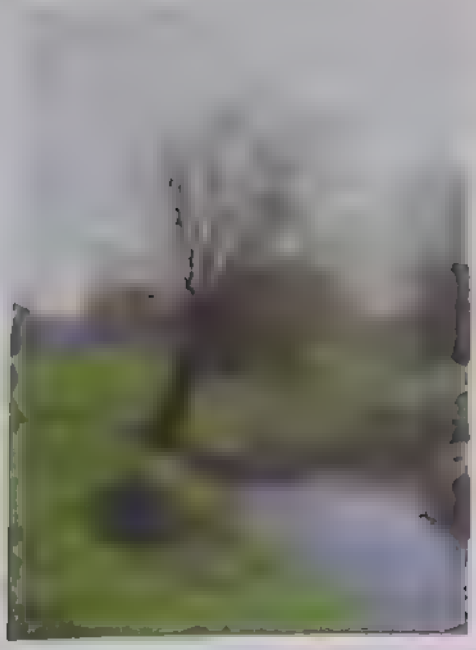
Nevertheless, it is important that the series has some cohesive idea behind it. A collection of shots of similar subjects does not necessarily make a good series. They must have something to draw them together visually—perhaps a similar treatment of the subject. And, of course, a series approach is no excuse for weak shots: a single weak shot can detract from the effect of the whole series.

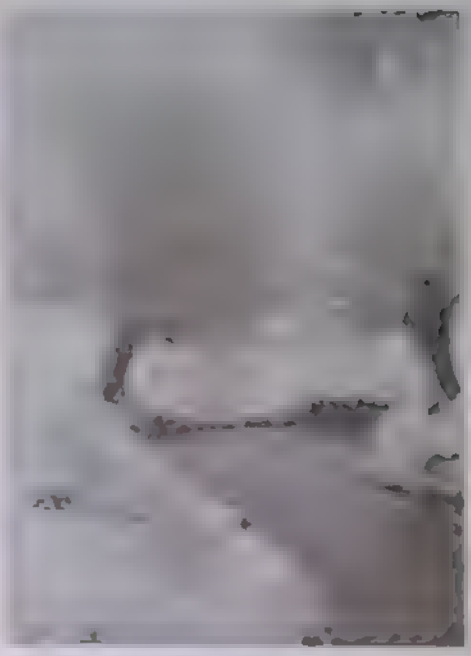
Once you have decided on a particular series, there is no need to work on it to the exclusion of everything else. You can simply keep it in the back of your mind and keep adding shots when the occasion arises, though this depends on the nature of the series. However, a series approach might provide some interesting new angles in a single photo-

Four seasons *Almost any scene will reveal changes throughout the year, but rural areas work best. Choose days which you feel typify each season best, if you can. You can extend this series almost indefinitely from year to year*

Chairs *No subject is too mundane to be ignored as a theme. In fact, your pictures should bring out the wide diversity to be seen. Chairs are an ideal subject, since making them has been a craft for centuries and they are found wherever you go*

Graeme Harris

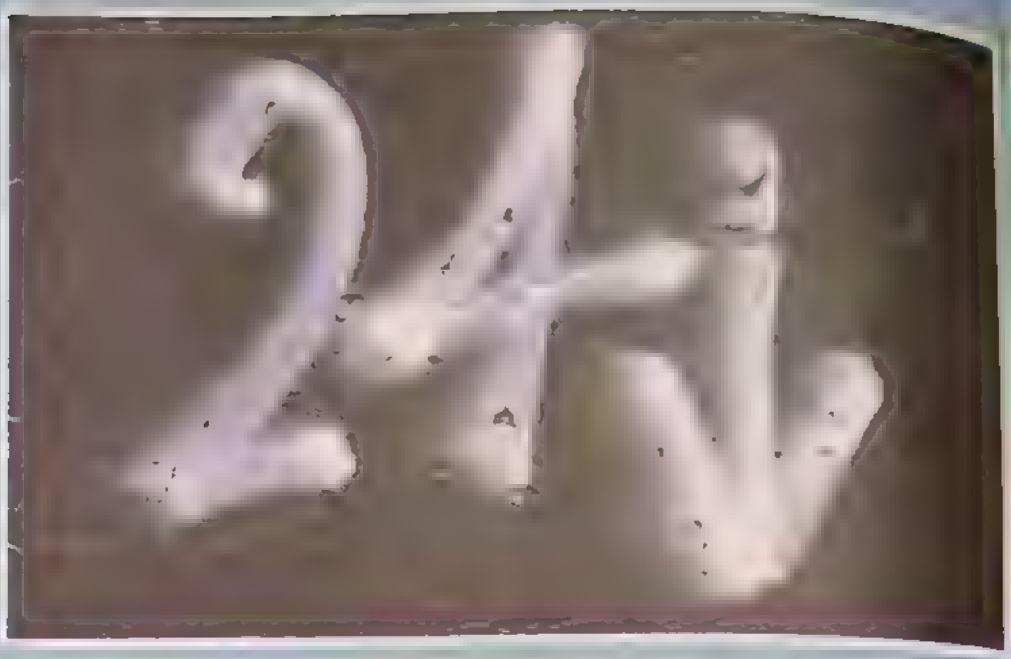




Spot the theme *A series such as this is ideal for display since the theme—the colour red—is most obvious when the shots are seen together. It is best in this case to choose objects which are as diverse as possible yet which have colours which match as closely as possible. A two colour theme is also worth attempting, particularly if the objects have similar shapes*

[illegible] For example [illegible] very [illegible] Try so[illegible] for [illegible] another [illegible] the [illegible] photograph [illegible] hands [illegible] end up with a [illegible] subject [illegible] revealed as [illegible]

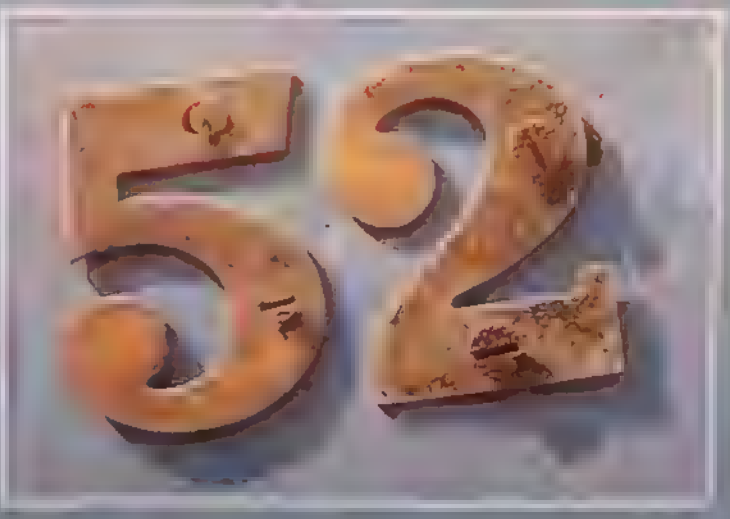
Other sets [illegible] shot over a [illegible] time are 'before and after sequences'. A building or neighbourhood, for instance can be shot before, during and after

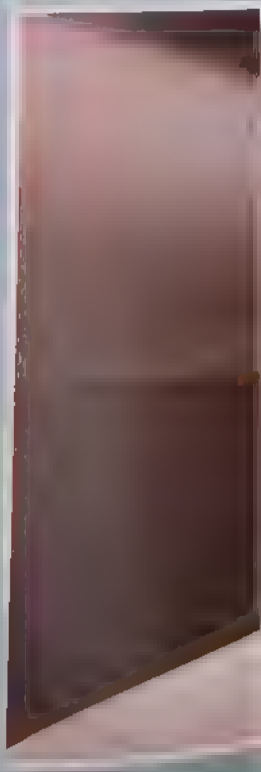


Numbers [illegible] which can be [illegible] number anywhere. Photographer Ed Barnas uses film ends to photograph numbers wherever he happens to be. Those here include a New York theatre ticket shop front and door numbers, and the number on a railway carriage on Snowdon mountain railway in Wales. All were taken using a Micro-Nikkor lens. He also photographs letter boxes and stripes

[illegible] with [illegible] professional [illegible] show [illegible] to [illegible] into [illegible] subject. The scale [illegible] weight of the [illegible]

[illegible] start thinking about longer [illegible] and that there is an [illegible] number of subjects open [illegible] Your family or friends could be [illegible] a set of group or individual [illegible] or you could expand to a [illegible] of a family as a part of a [illegible] along the lines of [illegible] see page 1977. [illegible] own town or city for instance. [illegible] a set of shopfront photos





be the focal point. Or else you narrow down the idea further on shop d[illegible] studies of sign lettering. The [illegible] such a theme could depend on differences between simple and highly

Handy work *Parades and other public events give Sergio Dorantes the opportunity to extend one of his themes—people's hands, which can be particularly expressive*

Shadow shots *In Alan Porter's series the shadows are a constant theme which links a wide variety of photographs on different subjects. The shadows need not feature prominently in the picture*

a set which allows direct comparison

A series need not necessarily involve the same subject: the theme could be a particular colour or a particular weather condition. However, with this sort of project you have to plan your approach carefully to avoid ending up with a collection of unconnected photographs which just happen to feature a particular colour.

The colour green, for instance, is found in a range of subjects from close-ups of leaves and plants to the corrosion of copper and bronze or a verdant rural landscape. But for a series the scope is too wide and visually the set would not say a great deal—except perhaps how pleasant the colour green is. However by thinking about a potential 'green series' a little more carefully you might well decide that it would be far more productive to concentrate on a more definite aspect. For instance, green leaves come in a huge range of shapes, sizes and shades of colour. A series of photographs using quite a wide range of lenses and techniques could be built up starting in early spring and lasting through the autumn. It would make both a strong visual statement about nature as well as creating a strong feeling about the colour.

Any colour can be treated as a theme, although some colours offer far more scope than others. Red, for instance, tends to stand out wherever it is used, but the idea of red as a colour of aggression is a little too obvious as a theme. Too much red is also overwhelming. It might be better therefore to look at other aspects of red and try a subtle approach. Small areas of red in an otherwise colourless scene might provide a good starting point for a theme. A red bus in a wintry landscape, a red car in a mass of black taxis, a person in a red jumper in a sea of grey suits or a red hang glider set against a crystal clear azure blue sky are all examples of a more thoughtful use of red.

The same approach is even more necessary in an abstract theme which uses a colour as a major element. The theme colour must never be allowed to dominate the other colours unless the subject itself is of interest or if the emotional content of the colour is appropriate to the overall mood of the picture.

A set of abstract photographs where colour, form and compositions make up the basis of the relationship is an ideal subject for a series. A strong set of shots could be based solely on geometric shapes. Since the photographic frame is usually rectangular, the use of the diagonal is the simplest starting point—on this line you can introduce other photographic elements. Triangles or circles of shape and colour can be framed along this diagonal. Modern buildings are a particularly good subject for this type of photography but you will also find plenty of scope in cars, coaches, bridges and details of other man made objects.

Apart from colour and purely abstract design, there are several other photographic elements that can be emphasized to create a series of photographs. Texture, grain, reflections or movement could all be featured as a set. For example, the skin tones of a human body could be the starting point of a close-up series based on textures. From here you could continue with a detailed set of shots on brick, wood, stone, sand, metal or any other contrasting texture.

A series concentrating on movement could encompass anything from a set of sports pictures all shot at slow shutter speeds to blur movement, to a group of shots showing movement in nature—waterfalls, water dripping from trees, fields of wheat moving in the wind.

However, whatever the subject you choose to photograph as a series you will find that the discipline of an extended project and of looking for several images which relate to the basic theme is worthwhile in itself. It will train you to notice small details or aspects related to the main subject that might otherwise have escaped your attention. Not only that, but also you will end up with a set of photographs that will make far more impression upon the viewer than a single image is ever likely to manage.

What went wrong?

On the beach

'Holiday snaps', taken on the beach, can be the starting point for much more interesting pictures as professional Homer Sykes shows

I like the composition here, especially the inclusion of the log at the top of the picture It's a pity that this is not sharp. A tripod would have helped Use a slow shutter speed and stop down as much as you can for the depth of field. Another version of this picture would have been to include the sky line. A lower angle or a slightly wider angle lens would do the trick When wandering around on the beach, don't feel satisfied with just one picture like this

This picture could easily have been improved It is really a rather dull picture If I were taking this picture, I would have chosen a different time of day In hot sunny countries the light at midday is very boring and contrasty Far better to wait until evening when the sun is low and the shadows are longer A polarizing filter would darken the sky, giving some depth to the picture I think the photographer should have tried to get some human interest into this shot

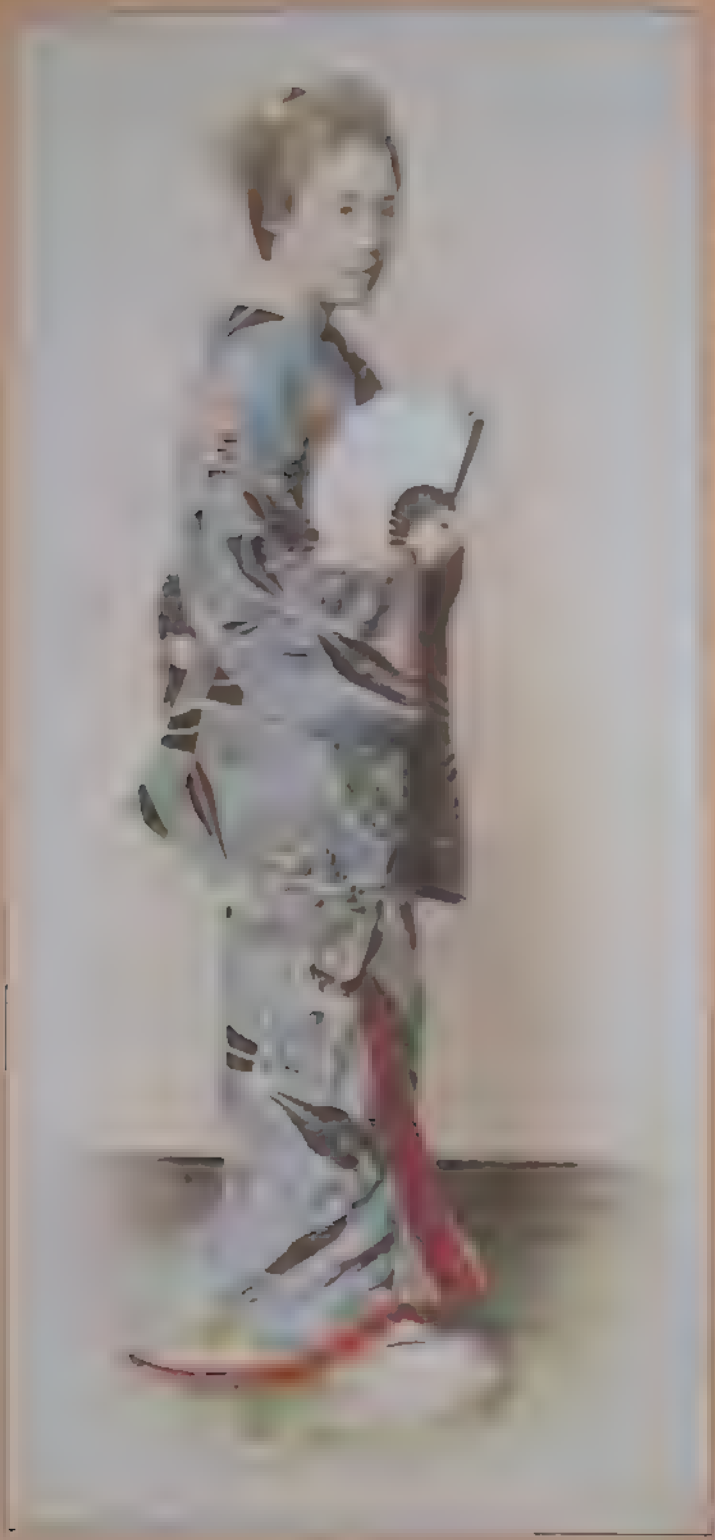
This photograph of a mother and child on the beach is really awful Almost everything is wrong. But it is at least sharp and the photographer has managed to give it the right exposure. The mother's face is in shadow and as a result we can't see who she is The photographer should have either waited for the sun to move or else moved his subject The child's teddy bear has its face turned away It would have been far better to see its face One of the woman's feet has been framed out The angle is also all wrong and as a result, half the picture is of out of focus sand that adds nothing to the photograph The other half is an equally uninteresting area of sea The waves are breaking, but unfortunately directly behind the child's head, thus distracting from the main point of interest

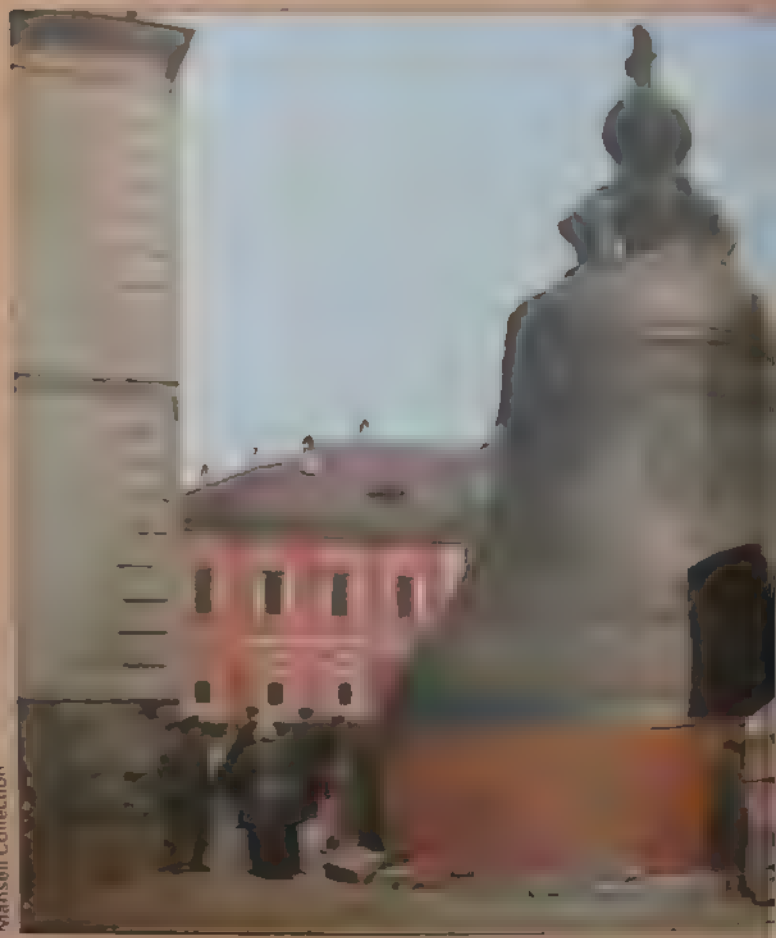
This is really quite a good picture However it could be improved with just a little more planning of the composition What a pity that the photographer cut the mother's legs off just below the knee and that the children are hidden behind each other The mother should be positioned higher up on the rocks so as to include all of her with the children not so tightly arranged One child could be standing perhaps with a hand on mother's shoulder and the other child could be sitting or crouching

TR SOU

From hand tints to Kodachrome

The earliest colour photograph [illegible] years before the first truly modern [illegible] years were far from uneventful in the hist[illegible]





Mansell Collection

made were extravagant. A crystoleum painting method, for instance, offered to 'transform your photographs into pictures' incorporating 'Nature's colouring'. Some, such as the Flexichrome process (introduced as late as 1940) could, in skilled hands, give deep pure coloured pictures—Flexichrome, unlike most methods did not involve colouring a black and white print, but applying dyes to a gelatin relief image.

Hand colouring continued to be [illegible] Even as late as the 1950s, some photographers preferred hand colouring, because it was simpler and more reliable to make a black and white print and take it to an artist, than go through the long exposures and processing sequences needed for a colour photo. Look in shops in out of the way places and you may still find coloured postcards on sale, easily recognizable by their grey look and the misalignment of blocks of colour—caused by poor registration of the stencils used to print them.

While the comparatively low price of hand colouring gave it popular appeal until well into the 20th century, photographers had always hoped for a real photographic colour process, a way of recording colours in the same way that black and white photography recorded tones. And throughout the 19th century, numerous scientists, inventors, photographers and businessmen tried their hands at producing a [illegible]

At first, the inter[illegible] largely scientific and the [illegible] were made by phys[illegible] Seebeck and Sir John Herschel who [illegible] colour acording to the colour of the light. But once photography began to be [illegible] that the inventor [illegible] process would not only be widely applauded—he would also be very rich.

Soon all kinds of people joined the [illegible]

Russian bell *For mass-produced travel pictures and postcards like this stereo bell in Moscow c. 1910, it was far more practical to colour a black and white print than make a genuine colour print even though processes were available*

Arum lily, 1898 *A lantern slide made by the first additive screen process – the Joly line process*

Frederic Ives and the Kromskop *Among the many practical inventions of the American photographer Frederic Ives was the Kromskop of 1915 for viewing stereo pairs of separation positives*

[illegible] graphically coloured lantern slides.

[illegible] that there were [illegible] and the [illegible] slow and painful. Often [illegible] that seemed to be [illegible] could not be expected [illegible] under the further pressure.

In 1855 the young Scottish physicist James Clerk Maxwell – only 24 years old at the time – suggested the use of three primary colour filters for recording and projecting a full colour image using black and white photographic material. [illegible] It seemed to be the answer. And after his demonstration of the [illegible] with the aid of photographer [illegible] it might have

movie camera working on the anaglyphic system

The Kromskop was rather like the chromoscope proposed by Ducos du Huron in France 30 years earlier. By using a clever arrangement of coloured transparent reflectors the Kromskop enabled a viewer to look through an eyepiece and see all [illegible] positives combined [illegible] image. Indeed [illegible] actually gave a 3 [illegible] stereoscopic [illegible] positives

The Kromskop was intended mainly for commercially produced pictures— [illegible] sonal photographs. These pic[illegible] taken on a camera that, like the [illegible] used an arrangement of [illegible] prisms to allow the three s[illegible]

be produced in a sing[illegible] ever, Ives [illegible] back that fit[illegible]

the [illegible] popula[illegible] Kromogram[illegible]

Mansell Collection

Mary Evans Picture Library

Personnaz/Société Française de Photographie/Fotogram

Bergon/Société Française de Photographie/Fotogram

The Autochrome process, *using an additive screen of dyed potato starch grains, was the first popular colour process. When it was first introduced in 1906, the art world took it up enthusiastically and there is a strong artistic influence on many early Autochromes. André Personnaz, the French photographer who took the limpid river view (right) and the flower girl (page 2229), was a great friend of the Impressionist painter Pisarro, and the influence is clear. The influence of Manet is similarly evident in the nude by Paul Bergon The inventor of the Autochrome process, Auguste Lumière, is pictured in his lab (left), applying dyes to the starch grains. The engraving shows plate making in the Lumière facory.* **Three-colour cameras** *gave photographers the three separation negatives needed for prints in a single exposure*

While Ives was working on the Kromskop, however, a professor in Dublin called John Joly was developing a system which, while not giving such high quality results, was the forerunner of the first genuinely popular colour process. Following another idea of the Frenchman, Ducos du Huron, Joly's success was in ruling red, green and blue-violet filter lines on a gelatin screen set in front of a photographic plate. So the three separations need[illegible] for a full colour image could be recor[illegible] on the same plate. Only one exposure was needed, and the resulting slide could be viewed without any [illegible]

Courtesy of the Kodak Museum

equipment. A similar process was invented, also in 1895, by James McDonough in Chicago. Although both systems were marketed, neither were successful because the lines cut out so much light that exposures were unacceptably long.

Some years later, however, the French brothers, Auguste and Louis Lumière made the big breakthrough with an improved screen process, using dye potato starch grains rather than ruled lines. This process, known as Autochrome, was introduced in July 1906 and was an instant success. Alfred Steiglitz, the leading light of the Photo-Secession

[illegible]

standards [illegible]

Over the [illegible] screen pr[illegible] from Agfa [illegible] undoubtedly [illegible] large colour [illegible] the great disadvantage [illegible] light they [illegible] blocked [illegible] and made e[illegible] and white [illegible] enough to stop action [illegible] colour did not achie[illegible] almost 100 years.

Even as colour screen proce[illegible] making their mark, work was progressing on a colour system that was to prove the answer to this problem. Again, the original idea of subtractive colour (see page 1940) had come from the fertile imagination of Ducos du Huron. But it took almost 70 years for the idea to become a viable alternative to additive processes.

At first, people concentrated on developing special cameras for the subtractive process, rather than on the film. Undoubtedly, one of the main reasons for this was that amateur inventors could

[illegible] green [illegible]

plate camera.

Various s[illegible] some successful [illegible] others [illegible] successful—including [illegible] Colorsnap (on film as [illegible] which proved to be one of the biggest financial disasters in the history of colour photography. After massive investment Colorsnaps were launched in March 1929 amidst a blaze of publicity. By December, the company had been liqui-

[illegible] was [illegible] Post [illegible] had [illegible] Eastman [illegible] Mees.

[illegible] images [illegible] plate [illegible] subtractive [illegible] dyes [illegible] wonderful [illegible] expensive. These problems were [illegible] complex for the amateur to have much chance of solving and research beyond the laboratories of the big photographic companies like Agfa and Kodak. But there were exceptions.

Intrigued by the problem, a couple of young professional musicians, and inseparable comrades, the pianist Leopold Mannes and the violinist Leopold Godowsky, began to experiment with their own colour plates. Early in the 1920s, they had arranged a meeting with George Eastman, the founder of the Kodak Company. For a number of years they worked independently. However, Kodak's head of research, Dr Kenneth Mees, gave the pair considerable encouragement and by 1928, Dr Mees decided to risk taking them on the staff at the Kodak Research Laboratories in Rochester. But in the tight-knit community of Rochester, the appointments caused a certain amount of resentment at first. The two musicians had only one bachelor degree between them, yet they had to [illegible] of highly trained scientists.

To make matters worse [illegible] number of annoying habits, [illegible] which was whistling in the dark. They did this not to amuse themselves, however, but to time their photographic processes. Years of musical performance had given them both perfect timing, and by whistling Tchaikovsky's 6th Symphony they were able to keep time in total darkness—a luminous clock could well have fogged their plates.

Village scene *Dufaycolor, c. 1937.*
[illegible] the additive screen processes. The screen often [illegible] lines per mm. [illegible] quality and the [illegible] perm exposure [illegible] in bright sunlight. It remained popular [illegible] into the 1960s. **Summer picnic** [illegible] Despite massive investment [illegible] subtractive process proved unsatisfactory and processors were reduced to colouring prints by hand.

Leopold Godowsky and Leopold Mannes.
[illegible] together [illegible] to create Kodachrome film [illegible] **Street in Paris**, 1938 [illegible] the president of [illegible] Agfa [illegible] film. Agfa [illegible] manufacture, making processing simple.

Which paper?

Once you can produce good prints on your standard make and type of paper, it is time to explore the range of papers available. There are a large number of paper types on the market and each gives a different base tint, image colour or surface texture

Dave King

Dave King

Surface choice *The basic choice you can makes lies between glossy (above, upper sheet) and matt or pearl (lower sheet). All makers offer these in both resin-coated and fibre bases. Glossy paper renders finer detail and gives deeper looking blacks, with a wider tone range, but matt paper is more suitable for display*

Some photographers only ever use one type of paper for all their black and white prints in the reasonable belief that familiarity is the best way of perfecting technique. But there are many different paper contrast grades, surfaces and emulsions, each giving a slightly different effect And the difference between a competent darkroom technician and a master printer is the ability to select the paper to suit the picture

Contrast grades

When printing in black and white, your main decision is between the various grades of paper (see page 2238), and your choice must obviously depend on the effect you want to achieve For most prints you clearly want a good 'average' range of tones, and the paper grade must be selected to give this result with each negative. Alternatively, you can use harder grades than normal to achieve a contrasty effect which accentuates harsh, 2-D shapes and plays down form Or you can use soft paper to achieve the opposite effect

It is usually easier to become familiar with the effect of paper grades and speeds if you stick to just one make of paper But by switching developer types and changing exposure methods, you can still make subtle and often worthwhile improvements to the image quality of your prints

You could, for instance, achieve higher contrast by using more concentrated developer than normal—or 'speed' developer in place of a normal two minute one. This can add considerable 'punch' to an image without losing too much shadow and mid tone detail

When developed for longer than normal, prints on rapid development RC paper (such as Ilfospeed and Ilfospeed Multigrade) can sometimes gain surprisingly in depth and impact Development should last about two minutes and exposures should be such that the image appears after about one minute—though it may be necessary to reduce exposure to retain any shadow detail

Alternatively, you could try developing RC paper in a different developer make or type, but you should not do [illegible] with Multigrade For example, t[illegible]

Kodak paper selection *Only a few of the full range of papers manufactured by Kodak are available worldwide—but their selector card shows the effect of different surfaces*

Dave King courtesy of Kodak Ltd

characteristics inc [illegible] (see below) are not [illegible] when Ilfospeed, developed [illegible] Ilfospeed developer [illegible] results passed th[illegible] 'normal' developer [illegible]

If you are using standard [illegible] bromide paper you can achieve extra control over contrast by varying the relationship between exposure and development. A [illegible] aperture will often [illegible] contrast result [illegible] wide open [illegible] sure received will be the same. The difference can be [illegible] quarter of a trade [illegible] place at higher temperatures.

Image colour

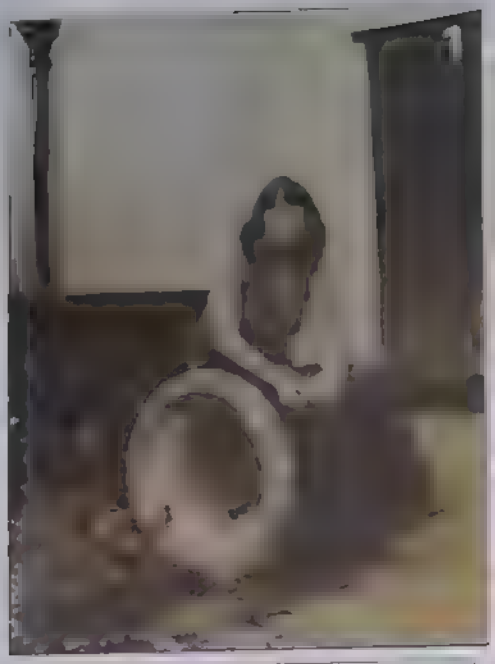
The image colour of black and white printing paper can range from one make's blue-blacks to another's warmish, almost brown-black. Although this image colour is largely a characteristic of the paper emulsion (see page 2126) often substantial variations can be introduced by subtle manipulations in exposure and development—particularly with chlorobromide papers. Chlorobromide papers give warm images compared to the neutral or cold blacks normally obtained with papers whose emulsions are mostly composed of silver bromide. Although most subjects need a cold or neutral black image, a warm-toned image can improve some subjects such as portraits which look better for the soft, subtle image and the apparent increase in shadow detail. Developing to achieve a warm tone is also a quick and simple alternative to the preliminary sepia toning needed in some toning processes.

Developers like Kodak Dektol, Selectol, and D-163, and Agfa Neutol WA, are designed to give the warmest results and by experimenting with the use of these, you can achieve subtle variations in image colour by direct development.

You may be able to use your normal, energetic print developer for processing chlorobromide paper. But instead of using the normal dilution which would probably give cold or neutral blacks [illegible]

Image colour *The warm brown image offered by chlorobromide paper (below) compares with the fairly neutral colouring of a purely bromide-based emulsion (bottom). This paper characteristic is worth exploiting for its pictorial effect*

Bob Ross



Contrast choice *The basic papers in each [illegible] y offer the widest [illegible]*

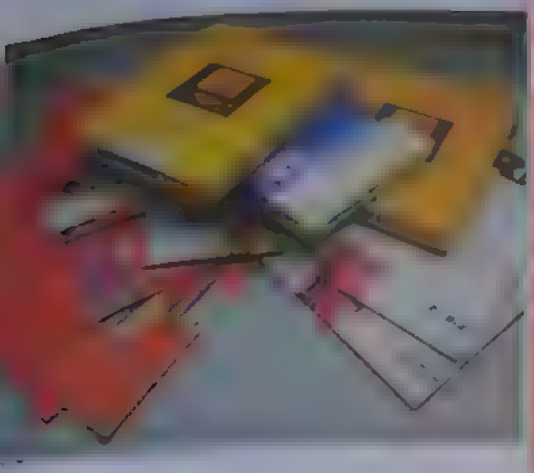
Paper surface choice

Making your own tests

The contrast grade and the other print characteristics of an ink [illegible] paper can be established [illegible] normal paper [illegible] experience. But for [illegible] find it rather quicker to [illegible] for characteristics such as paper [illegible] contrast. Kodak [illegible] step tablet two are shown below [illegible] used in place of a standard negative. These can be enlarged on [illegible] test prints like those shown [illegible] on page 42b illustrating the [illegible] Multigrade without a filter [illegible] and with filters [illegible] to 7 [illegible] left to right for the [illegible] strips. Although these tests were made for Multigrade there is no reason why you should not conduct similar tests for other papers.

By directly comparing the steps with those in your negative you can establish the [illegible] printing maximum and minimum densities of the negative.

You can also compare the printing speed of unknown paper with your usual stock [illegible] comparing the resulting tone step [illegible] given exposure. The number of visible steps will also give an accurate idea of the tone range that can be handled.



Paper choice *Most makes and types of paper are available internationally. But some special purpose or types of paper may have to be ordered specially*

[illegible] prints are mounted and displayed [illegible] situations where the utmost [illegible] their surfaces may be more suitable

A [illegible] lustre and satin finishes [illegible] with matte papers [illegible] matt and velvet or velvet matt [illegible] between brands are very [illegible]—the apparent grain on the surface may be [illegible] Kodak K high lustre finish or semi-matt be barely visible (as [illegible] Ilfospeed semi matt finish)

You can create or amplify the atmosphere of your work by selecting the appropriate surface. For a print to be submitted to a newspaper, you may need the brilliancy and higher sharpness of glossy paper. But for a high class portrait, a soft fine grain matt finish on a warm, off-white base may be better—the texture of the surface helps conceal telltale traces of retouching

Some papers have embossed finishes looking like canvas or tapestry and these are ideal for big enlargements where extensive retouching is necessary. A very smooth but textured finish like Ilfospeed matt or Kodak N finish accepts pencil retouching easily. Two other kinds of embossed paper finish are made *Silk* is a fine pyramid grain surface well suited to prints that will be subject to considerable handling. *Stipple* looks like 'pebble dashing' in miniature—and tolerates comparatively rough handling well. Both of these surfaces are frequently used for enprints for this reason

Base tint

Base colours can vary according to the baryta coating which is used. This may be tinted—giving natural ivory or off white backgrounds. Or it may be white, increasing the highlight tone separations—or fluorescent white that turns ambient ultraviolet light into visible brilliant white Commonly used white chlorobromide may not be as effective as a warm tone paper for say a low key mood portrait

Paper makes, types and surfaces

Resin coated papers

[illegible]

Ilfospeed RC comes in grades 0 to 5 in all surface choices gloss matt and pearl. Generally the middle grade Ilford papers seem to have a marginally lower overall contrast than the Kodak equivalent Kodabromide II Type 2450

Kentmere make an RC paper called Kentmere Satin and stipple finishes can be obtained in four grades and gloss is also available in an extra special contrast grade between 1 (soft) and 2 (normal)

Tura High Speed RC papers come in four grades with six surfaces white glossy white matt velvet, velvet matt white silk and white fine grain Tura also make an identical range of papers with self adhesive backs you simply process them like normal prints and when dry peel off the backing layer and lay it on to the mounting board There is no allowance for adjustment once contact has been made so your placing must be accurate The mounting board should have a porous or similar surface offering a good key for the adhesive

Variable contrast paper

Ilford Multigrade is an RC material coated with a variable contrast emulsion It is similar to Ilfospeed in that it comes in pearl and glossy surfaces and its range can be compared with that covered by grades 0 to 4 in Ilfospeed The different basic grades are achieved by the use of three basic colour filters when printing A set of seven further colour filters from straw yellow to purple magenta can be used to isolate one of eight grade steps' When used without filters the paper is said to be equivalent to Ilfospeed grade two but in practice, you may find it to be nearer grade one Multigrade requires its own special developer to allow both emulsions to work properly—but you can use this for other RC paper, including Ilfospeed

Kodak Polycontrast is a variable contrast fibre paper made for the American market It is available in gloss or matt lustre ivory lustre and high lustre white, and also smooth lustre white on a lightweight base It works on the same filtration principle as Multigrade but any proprietary developer can be used, although Ektanol and Dektol are recommended by Eastman

Fibre-based papers

In the UK plain fibre-based bromide papers are still available from Kentmere and Ilford, and both ranges are available in gloss stipple and semi matt (Kentmere call it satin) Glossy is made in grades 0 to 5 in Ilfobrom and 1 to 4 Kentmere semi-matt in grades 2 3, 4 from Ilford but 2 and 3 from Kentmere in doubleweight only Stipple finish can be obtained in grade 2 from Ilford but 2 3 and 4 from Kentmere Matt grades 2, 3 and 4 come from Kentmere and their silk surface, which looks like Eastman Kodak's embossed pyramids grain supercoating finish, is made in doubleweight only

[illegible]

Ilford [illegible] Brovira [illegible] bromide [illegible] have a plain white [illegible] particularly Galene [illegible] to that achieved by [illegible] ordinary print developers [illegible] needed for Galene or Brovira [illegible] Galene are obtainable in [illegible] five grades of Brovira are available [illegible] filigran glossy—which is like textured [illegible] stipple

Despite limited ranges in the UK Eastman Kodak still produce a wide range of fibre papers for the USA market as well as RC [illegible] range offers various surface options [illegible] F (glossy) and N (semi matt) types Kodak make surfaces coded E J and K finishes which [illegible] fine grain semi matt and get progressively [illegible] glossy and coarser grained The K finish surface looks like that of imitation leather

There is also a G finish This is the semi matt equivalent of K, but ivory based and [illegible] doubleweight paper and it is also treated to accept oil colours

Surface A is a smooth fine grain lustre falling between N and E It has a brilliant white base on extra lightweight paper and is said not to crack on folding R and X finishes are tweed and canvas embossed respectively -both have ivory tint bases and offer simpler retouching since the mottled surface hides any irregularities of spotting or knifing

Chlorobromide papers

The choice of true chlorobromide papers is fairly restricted and you may find it available only to order from one of the specialist photo dealers. All the fibre based chlorobromides are on double weight paper Agfa Record Rapid has four grades of contrast in glossy, which can be dried naturally to give a semi matt finish or a smooth lustre depending upon the amount of hardener in the fixer bath and the temperature of the drying A high gloss can be achieved by immersing the print in hardener in water before hot air drying For maximum gloss use Tetenal Mirasol glazing fluid and glaze the print

Agfa Portriga Rapid is a chlorobromide emulsion on an ivory base and comes in three grades equivalent to 1 3 5 grades in Record Rapid The surfaces are smooth glossy or fine grain semi matt which is a sort of textured eggshell finish

Agfa Portriga Speed is the only resin coated chlorobromide and comes in four grades on an ivory base with gloss or textures matt finish Tura is a French made paper similar to Record Rapid and Tura Record Rapid paper comes in four grades [illegible] has five surfaces available glossy matt silk velvet matt and white fine grain Kentmere follows the same lines but is made [illegible] with three grades soft normal and hard With all papers availability varies from place to place

Creative filtering

Often, photographers are divided over the effectiveness of special effects of colour filters, but like all other creative techniques, their successful use depends upon an imaginative and subtle approach

Many photographers believe that instant creative photography lies no further from their grasp than the special effects filters in the bottom of their gadget bags If it were as simple as that then everyone's collection would be brimming with creative masterpieces—but the reality is very different, truly creative shots with of without filters, are relatively hard to take

However, filters do have a place in creative photography but it is important to realize that special effects alone will not do the job for you When you are about to reach for a filter, you should already have answered an important question—'why does this photograph need it?' Basically, there are two answers 'To produce an unusual or attractively different image from the already good picture you see before you, or to make something of a subject that, without a filter, does not stand up as a good shot in its own right Whatever the case, you should always assess first the merits of a scene without a filter

More than anything, creative filtering needs a subtle touch: the filter should never draw attention to itself. If the first reaction to your pictures is 'Ah! that was taken with such and such a filter', you can be fairly sure that you have overdone the filtering

Clearly, then, the more dramatic special effects filters should be used sparingly. Indeed, it is often the mundane filters that are most valuable creatively, allowing you to make small but nonetheless effective adjustments to the image in the viewfinder Many photographers use colour balancing and compensation filters, for instance, only in situations where the ambient light and the film are in some way incompatible But these filters can be used to subtly alter the colouring even in a scene where no correction is necessary

In scenes where the colours are generally pale, for instance, you can often give pictures extra impact by strengthening the colours already present with a coloured filter. Warming filters in the 81 series are particularly useful in this respect, because people are naturally attracted to warm colours

When the sun is weak in winter, or when the vegetation is bleached by the heat of midsummer, landscapes can seem pale and insipid. A mild warming filter helps to bring out the colour. Even when the natural lighting or colouring is already warm—during the late afternoon or in autumn, for instance—you could use a warming filter to exaggerate the warmth and bathe the landscape in a rich, golden glow.

But it is important not to overdo it—a filter that warms up the landscape nicely may take all the sparkle and freshness from a blue sky. Try to make sure that the filtration is in sympathy with the scene and, to start with at least, use filters only where the result is 'realistic' or plausible. A yellowish sky looks attractive when the sun is low at dusk but distinctly odd when it is overhead at midday

Nevertheless, with a little thought, you can sometimes use strong warming filters 'unrealistically' to create a particular mood or feeling For shots into the sun or for scenes with strong contrasts, a strong warming filter tends to create the impression of heat—a barren white rockscape might take on the heat of a desert: an unexotic North Sea beach may have the feel of a tropical shore In other situations light brown or even sepia filters can help to evoke the warm golden glow of summers past—ideal for a nostalgic shot of a veteran car or an old country cottage But remember to exclude things that might look strange in sepia Again, it is also important to be sparing in your use of filters—people will soon get bored if all your pictures are brown

Cooling filters are slightly harder to use, perhaps because blues are generally less attractive in pictures than

Lee Battaglia/Colorific

Purple haze *Simple subjects are most amenable to filtering. Here, a graduated filter turns a lone figure in a snowscape into a moody and effective study*

Office block *Since this abstract scene was monochrome, two graduated filters were fitted. Both were angled to match the overall composition*

Obelisk *Special effects filters have been overworked and results can be dull, but here the star-crossed streetlamp nicely complements the floodlit obelisk*

John Sims

be a deep [illegible] range [illegible] impression of [illegible] areas [illegible] look like a bright full [illegible]

Cooling and warming filters are [illegible] only filters available for adjusting the colour balance in a picture. There are many other colours—indeed, any colour you care to choose. Each of these can be with imagination and a light touch, used to manipulate the colour of a scene to achieve a certain effect. But the number [illegible] snow scenes for instance [illegible] pale magenta filter. A pa[illegible] filter can also put a bit of colour in insipid looking brickwork. A strong magenta filter, on the other hand, can be used to

Promenade *On a dull day when the sky is weak and pale a strong graduated filter—here tobacco—can make all the difference creating a dramatic stormy mood in a normal seaside scene*

Slider *Multiple image filters are very popular but only with the right subject do they have anything but novelty value Here, with a simple dynamic subject the multiple image creates a feeling of action and movement*

Bridge

Racing the moon

R Leser/The Image Bank

at first, the effect soon palls

most useful creatively of all

therefore are graduated filters

Smack at sunset If sea and sky are dull, use an amber graduated filter to create an artificial sunset. This is effective when you shoot into the sun. But the foreground must be interesting

Nigel Snowdon

Indeed, there is no [illegible] cannot hold the graduat[illegible] place or at any angle to put c[illegible] weak area of the picture—alth[illegible] usually only horizontal alignments look natural. But it is important to choose the colour of the filter to suit the subject and avoid using unnecessary extremes.

lens and a narrow aperture the transition tends to be fairly abrupt with a telephoto and a wide aperture, the transition tends to be smoother.

Using an old camera

Courtesy of the Kodak Museum

Even though you can buy old box and folding cameras for just a handful of change, they are still capable of producing reasonable pictures. However, for best results they need a little extra care in use

Visit any shop that sells antiques and bric-a-brac and the chances are that you will find a pile of old cameras for sale. Cheap, simple cameras have been produced by the millions in the past and after a few years use their owners often dumped them in a dusty corner in favour of a newer model, or a different hobby. But even so, many of these box and folding cameras can still produce a perfectly good picture if you are prepared to spend a little time experimenting with film and exposure.

When buying an old camera at a shop or market stall, do not be tempted to spend a lot of money simply because the camera is old. Most box cameras are made of thick cardboard or thin metal, and were originally very cheap to manufacture and buy. Some were even given away free with soap powder. Because so many were made, and they are virtually unbreakable, there are still many in existence, and the true value of a box camera is very small. Do not be taken in by tales of scarcity value—one or two types of box camera are unusual, but you are unlikely to find these in a junk shop.

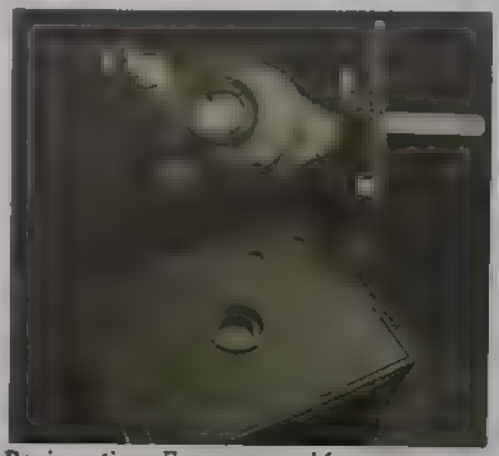
Folding bellows cameras are better made, and often have elegant leather cases, so these are worth a little more.

Apart from price, pay special attention to film size and type when buying an old camera. Take care with cameras which offer a "photo finish". These are easily spotted because they have a window at the back, through which the owner could write a short message on the film. The special roll film that made this possible ceased to be made in 1935, and the slot now only lets in light and fogs the film.

Virtually all cheap amateur box and bellows cameras used roll film, and this was at one time made in many sizes. The only size that is still widely available is 120, though in some countries you may still be able to buy the occasional roll of 828, 620 or 127. Try to avoid using a camera that takes any film other than 120, or you may have trouble obtaining supplies for it.

620 film is identical in width and backing paper information to 120, but is wound on to a spool that has a smaller core and narrower flanges (this made possible the design of more compact cameras). If you already [illegible] a 620 camera you may be able to press it into service by winding [illegible] and 620 reel in total darkness. Even so, you still need a second empty, 620 spool to act as a take-up spool in the camera, and few discarded box cameras ever [illegible] more than one empty spool.

If you are uncertain about the film size that your camera takes, open the back of the camera and look for the [illegible] on the door. The size is usually printed on [illegible]



Basic options *Exposure and focusing control varies widely between models (above). Many box cameras have no exposure controls at all, and this means using neutral density filters with modern films in bright light*

Dave King

stamped [illegible]

A [illegible] at the back [illegible] photographer [illegible] numbers on the [illegible] sure that this is by [illegible]

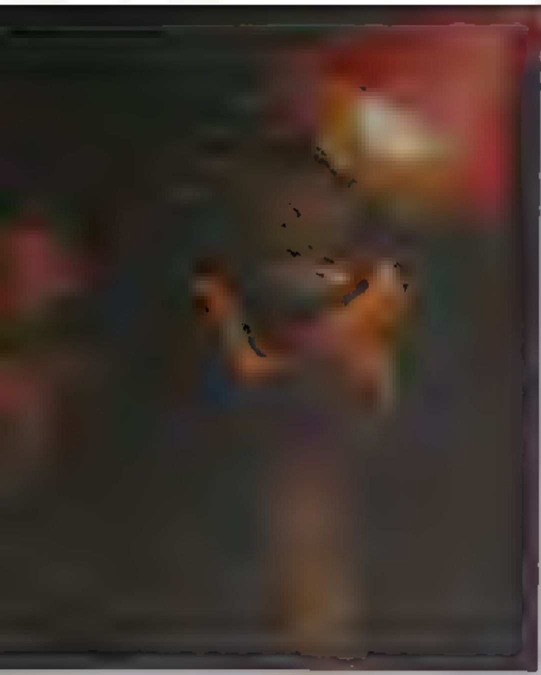
[illegible] damaged [illegible]

Check that the shutter [illegible] most box cameras [illegible] mentary seal [illegible] has only one or two [illegible] trouble. Consequently [illegible] box camera shutters [illegible] function perfectly. If the camera has mechanism for altering the size of the aperture, this usually consists of a metal strip pierced with three different sized holes. This mechanism is unbreakable—though prone to rust, and so needs little attention.

Folding bellows cameras are usually more complex. First of all, open the camera by pressing a catch or button near the front. Sometimes this catch is prominent, but it is often concealed under the camera's beautiful and embossed leather-like Nairoude covering. Poke around until you find a slightly raised or worn part of the leatherette, and then press. The camera front will spring open, and the baseboard can then be swung down and locked into place. If the camera does not open smoothly, do not use force—it may do permanent damage. Try and find out what is jamming the camera shut (this also applies to folding the camera up after use).

With the baseboard extended, pull out the lens and the bellows along the guide rails. A spring clip should lock the lens panel at the full extent of its movement. Now open the back of the camera, and hold it up to the light, to check that the bellows does not leak. Any pinholes that admit light can be covered with black fabric tape. Finally, check that the shutter works at all speeds—usually just 1/50 second, 1/25, and B or T.

Picnic snaps *Even the simplest box cameras (top left, bottom right) can produce reasonable quality results. Bellows models (bottom left) usually have more controls. But avoid cameras that use obsolete film sizes (top right)*



Checking bellows *Looking through the camera back with the lens towards a light reveals any pinholes in the bellows*

Using the camera

All these simple c[illegible] lacture[illegible] phot[illegible]

[illegible]

Shady view *The images in the simple viewfinders are not very clear and often need shading from bright light*

[illegible]

Spool sizes *Although they look very similar, these spools are for different film sizes, and are incompatible. However, 120 and 620 use the same width of film, and if you cannot find any 620 rolls, 120 can be wound on to the 620 spools in a darkroom and used instead*

[illegible] may seem [illegible] finder is [illegible] Carefully [illegible] you will see better [illegible] Everybody [illegible] indicated [illegible] window when it is centred [illegible] in position

If the window [illegible] black tape. Modern film [illegible] sensitive that very bright light [illegible] penetrate the red window and pass through the backing paper [illegible] the film. In these conditions [illegible] the window with [illegible] the shade of a tree or your own body [illegible] else in subdued light indoors

The viewfinder on simple box cameras usually consists of a mirror and two lenses. There is either a single viewfinder that swivels or two separate ones—one for vertical pictures, and one for horizontals

If you are used to using an SLR, your first reaction is probably to press the viewfinder to your eye. You will see nothing like this. Instead, hold the camera at your waist, and look down into one of the two glass windows, and you should see an image of what is in front of the camera. In bright light, it may be necessary to shade the camera with a hand to get a good view

The lens on a box camera is usually of the simple, uncoated meniscus variety which is prone to a wide range of lens abberations and, sometimes, low contrast. To avoid flat, washed-out pictures, it is probably best to obey the old rule about the sun coming over your shoulder, or at least from the side, unless the lens is deeply set in the camera. Take care that sunlight does not fall directly on the lens itself, or you will probably get a very disappointing picture

If the camera is of the bellows type, it may have a focusing scale, which you should adjust according to your estimate of the camera-to-subject distance. Box cameras have either no focusing mechanism, or a fairly rudimentary one

Write off *Autographic cameras have a window through which you write on special film—now they just lean right*

Red window *Arrows and then dots appear in the window before the first frame. Further frames are indicated simply by numbers—there is no mechanism to stop you winding further. It is often best to cover the window when not in use*

Checking focal length, aperture and shutter speed

F (focal le

Th equation g

of

fixed

not

The *f*-number is equal to the focal length divided by the aperture diameter.

The shutter speed cannot be measured directly, but there is a simple way to check it—use the method shown on pages 22.18 to 22.19.

Understanding...

Projection lenses

Tessa Musgrave

Projection lenses *have fewer elements than modern quality camera lenses. But for colour work, both enlarging lenses (centre) and projection lenses (outside) must be properly corrected*

Although modern high quality camera lenses seem to represent the ultimate in optical design and technology, they are not suitable for every photographic purpose. For both enlarging negatives for printing and projection slides, a number of different specialist lenses are usually needed.

Camera lenses can sometimes be used for both enlarging and projection, but the results are not the same as from specialist lenses. But some camera lenses, if used at a fairly distant [illegible] distance, [illegible] the negatives are very small.

Enlarging lenses

[illegible] the principal reason why a 35 mm lens cannot actually be used for enlarging is the difference in correction for aberrations. A camera lens is corrected for [illegible] lens distances of many focal lengths. An enlarging lens, on the other hand, must be corrected for [illegible] the negative [illegible] distance. It may be [illegible] a fixed focal length, nevertheless, a few camera lenses may be corrected over a range and tended to enlarging.

In the days when enlarging lenses were used only for black and white work, it was only necessary to make very simple corrections for chromatic aberration. While the eye responds most strongly to yellow-green light, printing paper responds only to blue light. So when the enlarger is focused visually, it is the yellow-green light which is focused. To give sharp prints, then, the lens needs only be corrected so that the yellow-green rays focus at the same place as blue light. A simple achromatic correction (see page 4[illegible]) [illegible].

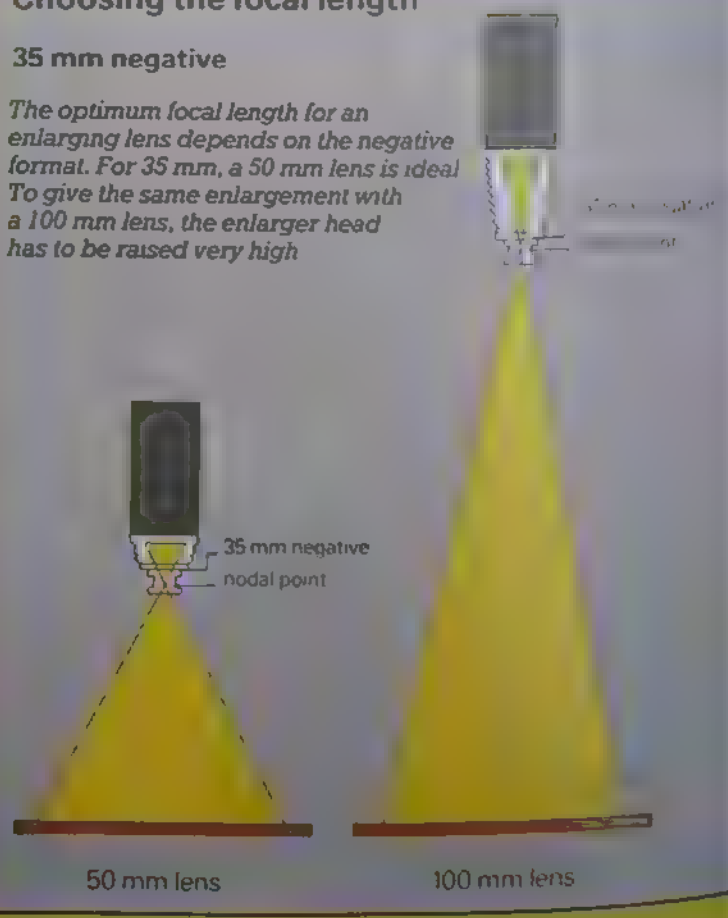
Unfortunately, a basic [illegible] that is not adequate for colour printing. Indeed, it is not really good enough for printing on orthochromatic black and white paper. On colour prints any chromatic aberration, both axial and lateral (see page 906), will show up clearly. Modern enlarging lenses therefore include extra correction elements to keep this to a minimum.

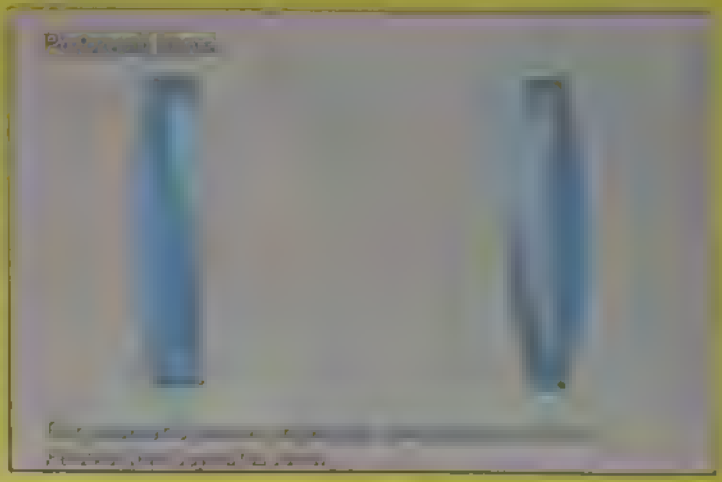
A further difference between camera lenses and

Choosing the focal length

35 mm negative

The optimum focal length for an enlarging lens depends on the negative format. For 35 mm, a 50 mm lens is ideal. To give the same enlargement with a 100 mm lens, the enlarger head has to be raised very high





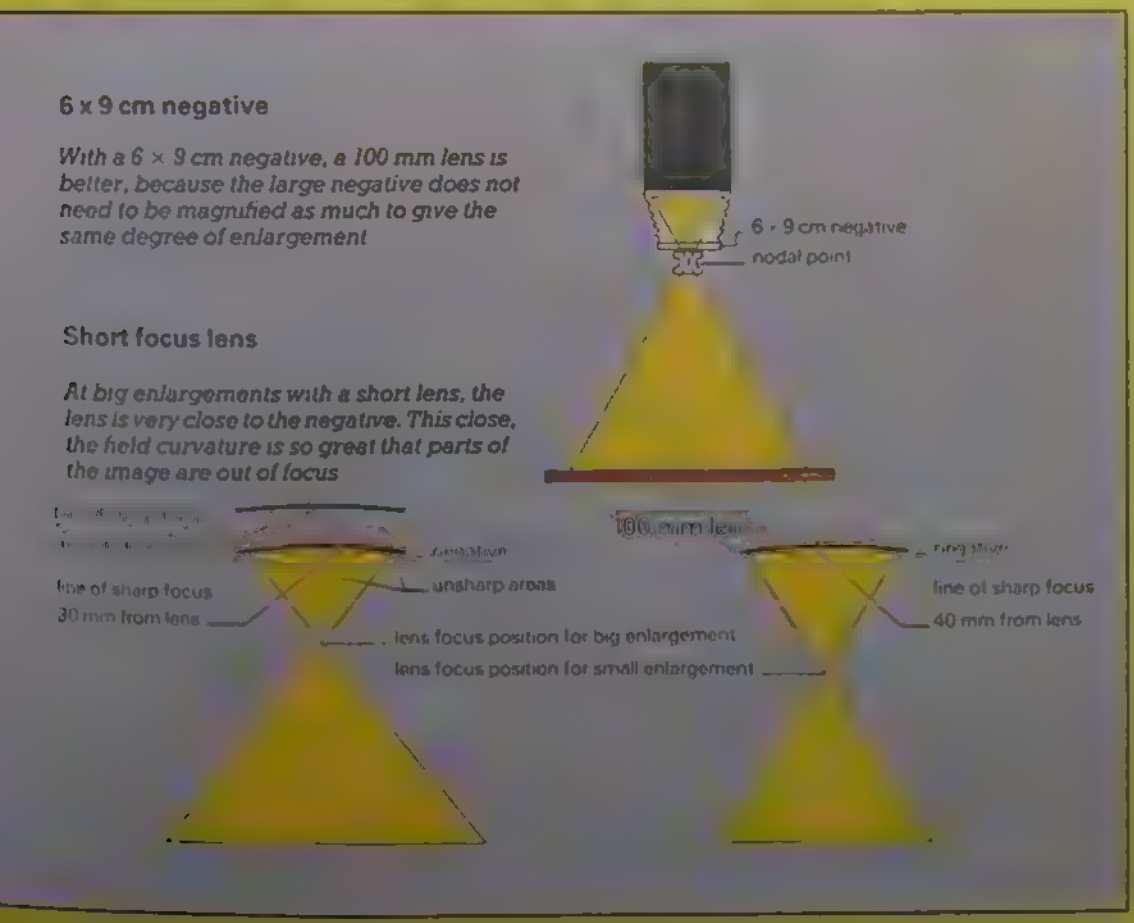
Focal length

Projection lens

pop and become slightly

image to focus together

which is evenly illu



6 × 9 cm negative

With a 6 × 9 cm negative, a 100 mm lens is better, because the large negative does not need to be magnified as much to give the same degree of enlargement

Short focus lens

At big enlargements with a short lens, the lens is very close to the negative. This close, the field curvature is so great that parts of the image are out of focus

Martin Wendlinger

Tripod construction

All tripods are built with the aim of supporting the camera, but there are great differences between them in terms of the strength of support they offer So just what factors make some models much better than others?

Roger Payling/tripod courtesy of Photax (London) Ltd

Inherent stability *A three legged platform, adopted as the standard camera support, is stable on a wide range of surfaces*

Tripod legs

[illegible] sons W[illegible] tubes are far less [illegible] and to cause [illegible] legs And it is more convenien[illegible] screw connectors on a tube

The material used should be rigid but not brittle, and unfortunately rigidity and brittleness usually go hand in hand In addition it should be free from vibration or at least have a short damping time

In the early days of photography, tripods were almost always wooden, but this is not really satisfactory Although it damps minor vibrations very quickly, wood is unsuitable because it tends to bend very easily—unless the legs are very thick and heavy So all modern tripod legs are made of metal The best material is duralumin—an alloy of aluminium and copper, with small amounts of other materials Almost all tripods legs use this material, though some actually claim to be 'pure aluminium'—which would be quite unsuitable Dural is rigid yet light compared with steel, which tends to vibrate more in any case

On many tripods the legs are enamelled or given some other chemically-bound finish Often this is not simply to make the tripod look better but to improve its stability It does this by helping to damp out minor vibrations A

A studio stand *provides an extremely stable platform for professional cameras and is mobile over level surfaces.*

[illegible] be considerat[illegible] reduced by using double legs, with tw[illegible] tubes side by side. The Multiblitz tr[illegible] on page 2253 is of this type. When th[illegible] is bent, the leg on th[illegible] the bend is in compression while the other is in tension, so the two effects [illegible] each other out. Unfortunately this [illegible] the leg more cumbersome [illegible] many tripods use single legs.

Stays or struts halfway down th[illegible] will both help to prevent flexu[illegible] damp down vibrations. But they will not overcome bad leg design, and some tripods with no stays perform better than those with poor design and stays.

Leg locks

The basic rule of tripod leg design is that the fewer leg sections, the better. But all portable tripods must fold down to some extent, so leg locks are inevitable. A common design on some professional tri-

Tripod boss

The Benbo Professional is among the m[illegible]st versatile and revolutio[illegible] tripod designs. The [illegible] for extend[illegible] and reversing [illegible] clamped by a single [illegible] lever [illegible] the most awkward recess [illegible] can be shot.

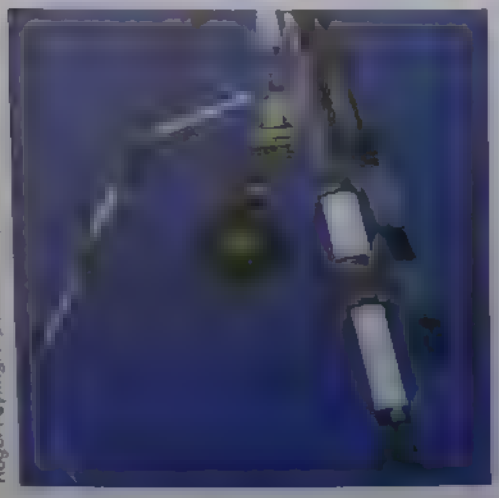
Paying tripod [illegible]

Manfrotto *Not all tripods will go as low as this, but it is a useful feature, allowing greater choice of viewpoints—the tripod is also more stable at this height*

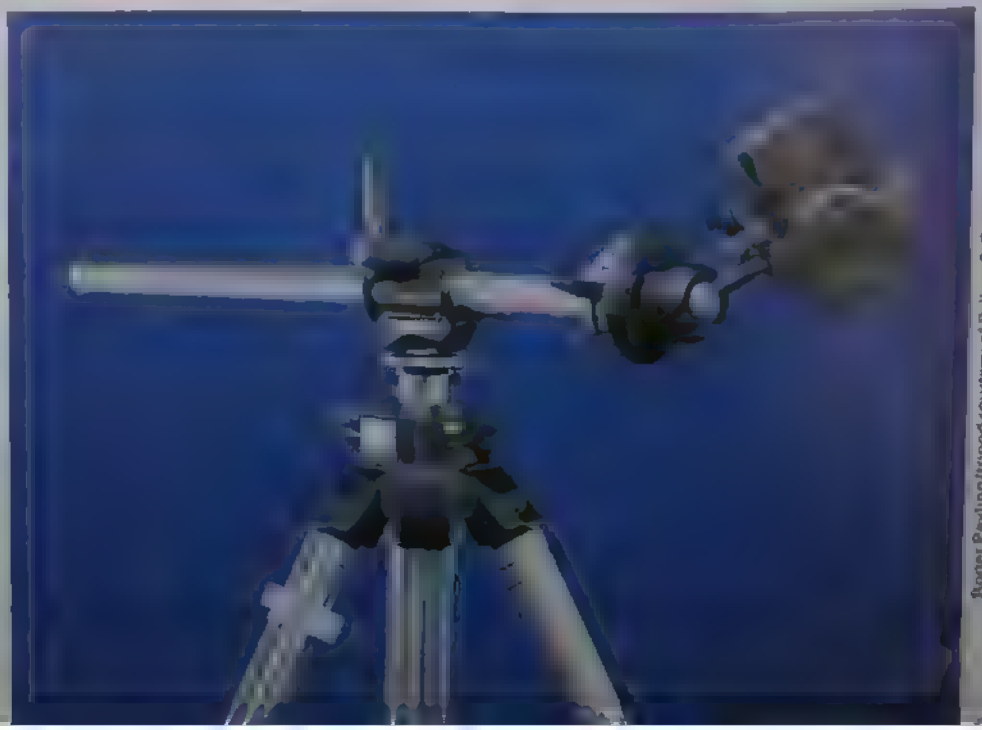
Much more common [illegible] centre column [illegible] and reversed [illegible] under the boss. This [illegible] close up work [illegible]

Also available [illegible] *lateral* extension [illegible] onto the boss [illegible] sideways. This [illegible] versatility in posi[illegible] but is unnecessary [illegible] studio portrait work [illegible]

A reversing centre column *(below, Sutz tripod) enables you to photograph low down, while a lateral arm (right,Manfrotto) shifts the camera sideways*

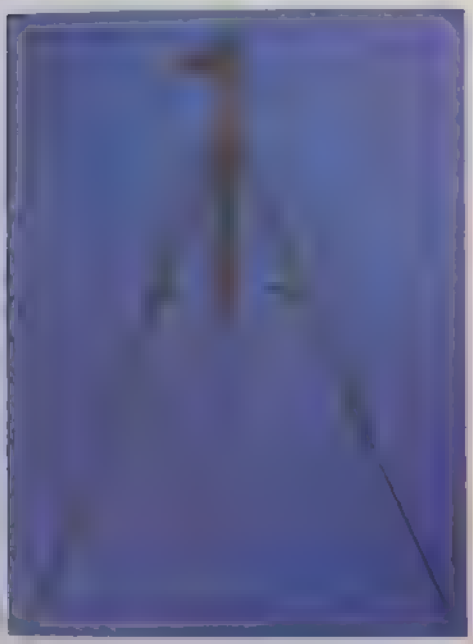


Roger Payling/tripod courtesy of Eumig



Roger Payling/tripod courtesy of Pelling & Cross Ltd

Osawa *A dolly readily converts this portable tripod for movie cameras*



Multiblitz *The double leg design makes this unit very stable for its height*

the camera is rarely required to be at a [illegible] range and [illegible]

[illegible] main, the Benbo trip[illegible] has a curved bolt [illegible] allowing the legs and centre [illegible] be clamped firmly in any [illegible] offering extreme versatility

Weight and performance

It is popularly believed that great mass i[illegible] essential for a good tripod. But this is n[illegible] ways true. A well engineered design can achieve good results without reso[illegible]ting to weighty components. All that mass does is to give the tripod greater inertia, which means that it is less liable to be moved by small knocks, but other factors are also important.

A heavy weight hung from the centre [illegible]

Tripod heads

Pan and tilt head [illegible] *have a quick release base, [illegible] can be interchanged [illegible] either of the [illegible] three [illegible]*

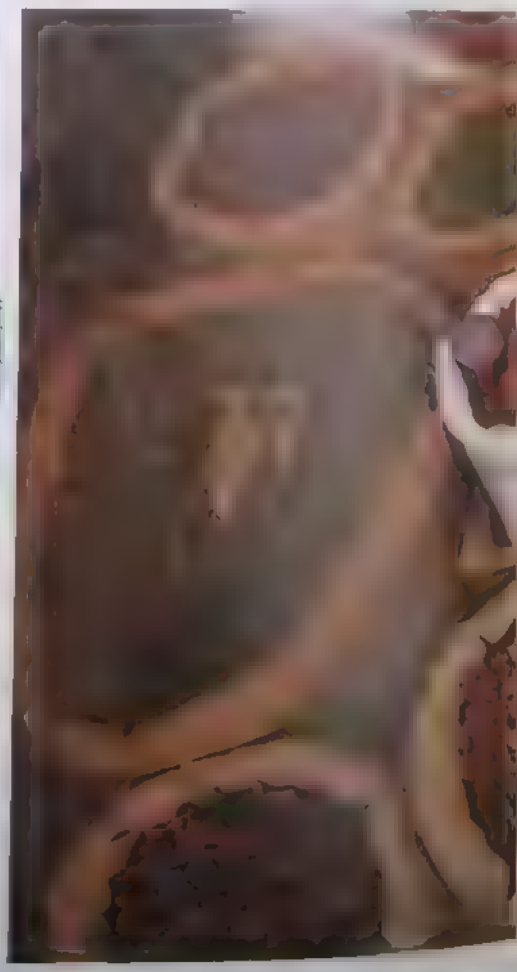
Roger Payling/tripod courtesy of Ke[illegible] Jo[illegible]

Assignment

Market place

Archways [illegible]

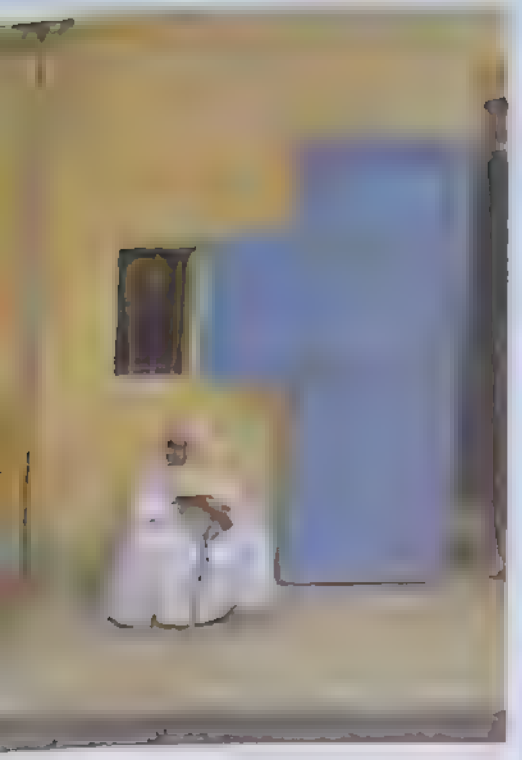
Blue doors [illegible] areas to give more saturated [illegible]



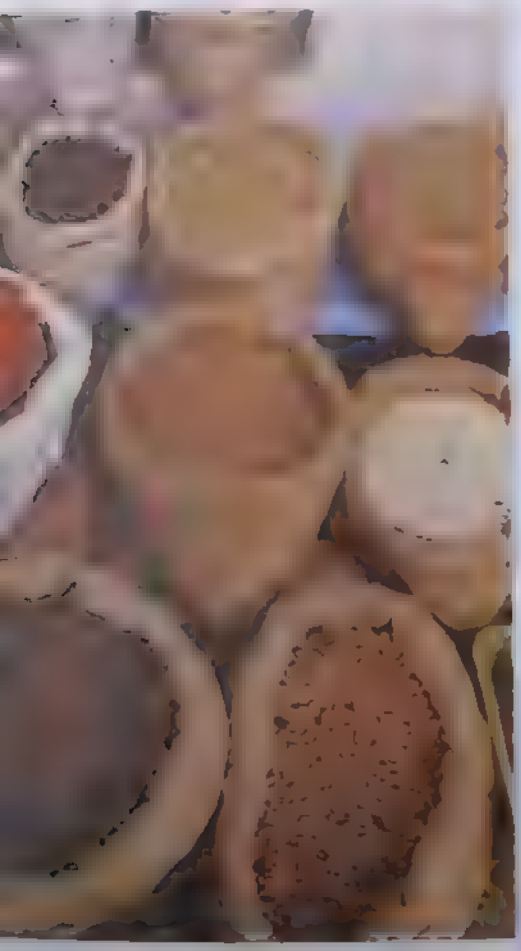
A market place is an ideal photographic location in any country, but Timothy Beddow shows that an Algerian market has particular charms to capture on film

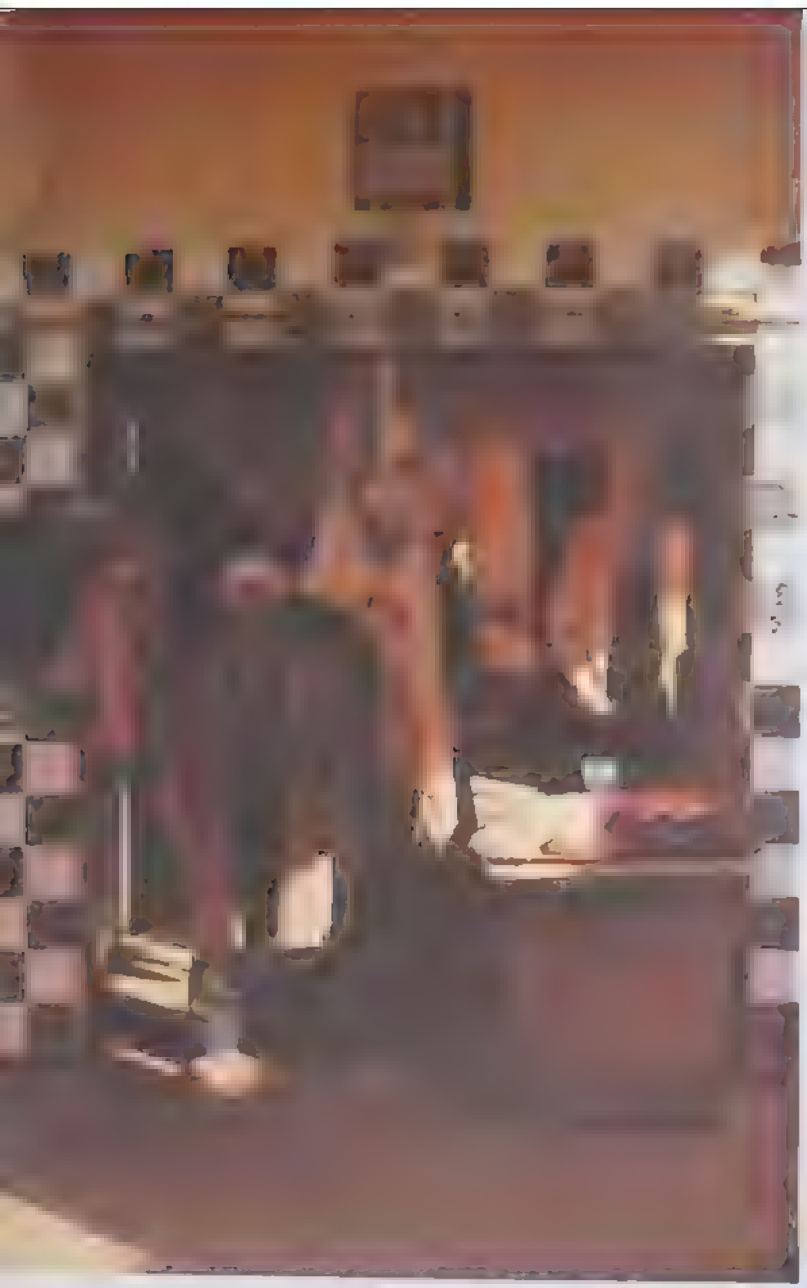
[illegible] marathon [illegible]

[illegible] all a [illegible] the market [illegible] ing up at first light to witness [illegible] involved in setting up the [illegible] lls. But before he ventured [illegible] an impressive view of the [illegible] which are characteristic of the [illegible] and also included the dunes of the desert looming in the background. The early morning light which enhanced the appearance of the scene is particularly valuable in this part of the world because for most of the day the sunlight is so harsh that all colours become washed out and all subtle



Bag of spices A 2[illegible]mm lens was useful for wide shots of the merchandise, like this colourful range of spices. **Domed rooftops** Using a [illegible]5mm lens from the vantage point of a mosque, Tim started with an overall shot of the town, bathed in the early morning light. **Stall holder** This shot was the result of getting on friendly terms with the subject before bringing out his camera.





Butcher *After getting the approval of the butcher, Tim took advantage of the soft shadowed light and [illegible] moments for this portrait.* **Sheep** *The pattern of the sheep tied together made an interesting good subject but Tim tried the shot from several different angles before deciding that this one worked best.* **Oranges** *The early morning sun in Italy made the colors look richer. All of these shots were taken on Kodachrome II.*

What went wrong?

Still life

'I feel still life photographs are difficult to do really well,' commented Homer Sykes on looking at these pictures. 'One can't help thinking of those perfect photographs by Edward Weston.' So what was Homer's verdict?

The photographer has made several simple errors. There is no central point of interest – the eye does not immediately go to either pumpkin. I also find the white area in the top right hand corner of the picture annoying. This could easily have been toned out by moving the camera slightly to the right or better, by simply adding another pumpkin. Neither of the two more prominent pumpkins are really sharp.

This photograph [illegible] works well as a simple record. By [illegible] record shots are being redundant [illegible] When photographing sculpture try different lenses. A long lens will compress the sculpture into the background, while a wide angle lens from a low angle will subtly distort the sculpture but could make the photograph much more interesting. Walk around to find different backgrounds.

This is rather [illegible] as [illegible] point of interest. [illegible] extreme [illegible] some fill in. [illegible] would [illegible] wasted space.

Perhaps [illegible] the past [illegible] The [illegible] is good [illegible]

The [illegible] space [illegible] hand corner [illegible] same [illegible] formed [illegible] in a little frame out the space or better still add some more mackerel to fill in the space.

The central point of [illegible] larger mackerel that have been put at an angle to be on top of the others. This is a good idea, but it would have worked better had the photographer positioned them so that we could see their heads. I would then have focused on their eyes and made a feature of the heads.

It is a very good idea if you are doing a lot of location still life photography to take a small tripod with you. This not only allows you a longer exposure and therefore more depth of field, but more importantly it allows you time to compose the picture carefully. Still life photography should not just be about snapshots.

Assignment

Channel crossing

A day trip from England to France—from Dover to Calais—is a typical subject for holiay snaps. We asked George Wright to show how the results could be made more than just snapshots.

A trip across the English Channel has become such a popular and easy thing to do that some people even make the crossing for regular shopping excursions. This ease of access to a foreign country made us wonder about the opportunities for a photographer—it seemed ideal—a quick, inexpensive trip which offered a look at a foreign country, a new range of subjects and the stimulus created simply by travelling.

All too often, though, the photographic potential of short trips is wasted—snaps, rather than seriously taken shots seem the inevitable result. But there is no reason why anyone should not accommodate good, interesting work within even a short trip, wherever you happen to go. With this in mind, we asked professional George Wright to see what he could come up with when out shooting as a day tripper rather than as a full time professional on assignment. George immediately reflected the view of any enthusiastic photographer. 'I find that just being in a foreign place gives me a fresh view of things so that you notice photographic potential in the most everyday subjects.'

Even the ferry crossing itself turned out to have photographic potential.

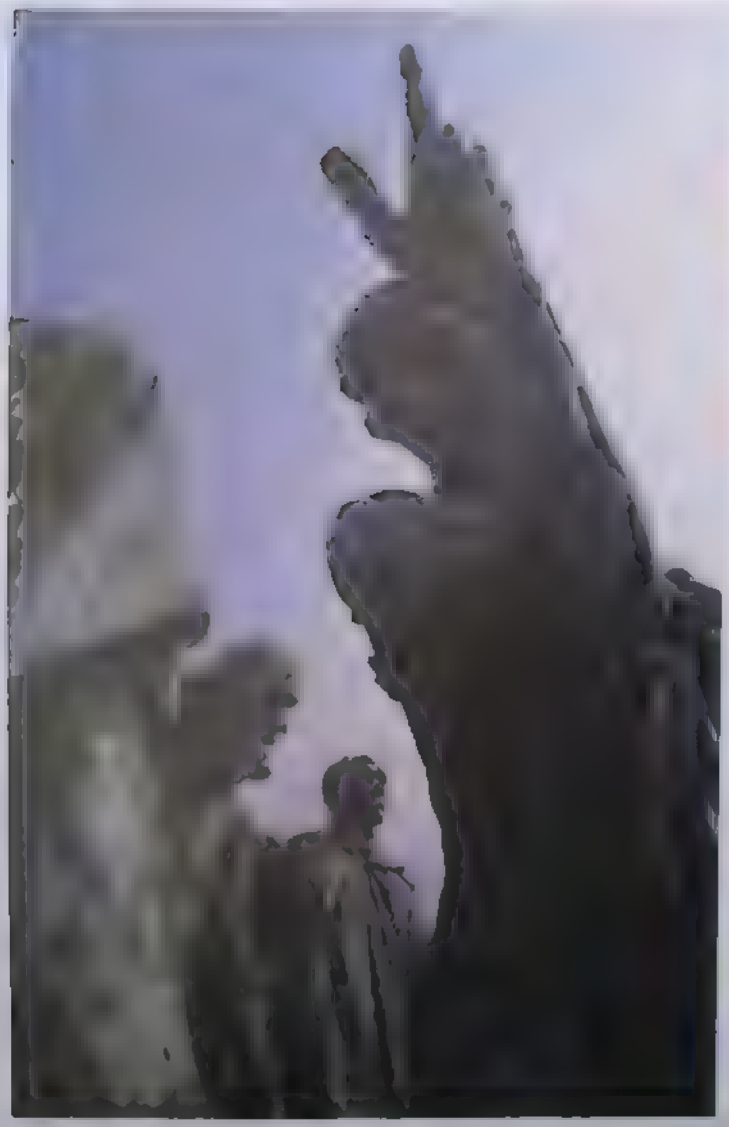
Ferry *Even before he boarded, George used his 300 mm lens for this shot of the ferry.* **Window display** *Details can convey much about a place's character*

George Wright

Before boarding, George pulled out his 300 mm IFED Nikkor lens and took a few shots of the vessel that was to go to Calais. 'I love photographing busy harbour scenes—especially if I have a telephoto lens handy to close in on the ships and the activity.' Once on board and under way George found further subjects in the passengers and on details of the ship's superstructure. The shot of the passengers sitting in the stern is an example of the sort of shots George took during the journey.

After arriving at Calais, and wandering around, he saw the potential in the town's central park as well as in the street scenes and the busy market. 'Parks and markets are the sort of places to head for if you want to try and capture the atmosphere of the place', George explained. 'Usually people are too involved in what they are doing to care about your camera or even notice you at all'. However, George also took quite a few photographs while just wandering around the main streets and backstreets. Here you find people [illegible] streetside [illegible] talk [illegible] [illegible]

Walking the streets [illegible]



Old men [illegible] **Burghers of Calais** [illegible] well-known Rodin sculpture

Doorway *George did not just walk around the centre of town – he also found plenty of subject matter while exploring many of the smaller backstreets.*

The market *is always one of the best places to look for local atmosphere and colour, but George had to rise early to capture this at its busiest and best.*

YOP *Advertisements are distinctive features of a place, but for the most George waited for the old man to pass by and provide an amusing counterpoint.*

On the ferry *During the voyage George found plenty of things to photograph – like these passengers. All shots were taken on Kodachrome.*

panions for a while and
t: town undi tracted for a

Audio-visual EQUIPMENT

Synchronized sound and vision is the exciting feature of A–V presentation. But each type of machine provides a different level of sophistication

Dave King/equipment courtesy of [illegible]

Twin projectors *with encoder and playback unit for automatic dissolves between projectors. Placing one projector above the other simplifies image alignment*

[illegible] types of [illegible] systems [illegible] system [illegible] two [illegible] shutters [illegible] two [illegible] lenses. These shutters are [illegible] controlled by a small lever [illegible] one opens the other closes [illegible] cross fade effect. Slides are [illegible] when the shutter is closed [illegible] is always an image on the screen. By modern standards this system [illegible] When used with wide [illegible] lenses it gives a vignetting effect [illegible] corners of the screen [illegible] brightens during a fade.

An electronic electronic [illegible] the lamps of the two projectors [illegible] electronically [illegible] variable [illegible] electronically [illegible] cross-over effect, with one light [illegible] ening as the other dims. There are problems with vignetting [illegible] the mechanical system can [illegible] any pair of projectors [illegible] requires either a purpose-built [illegible] projector or modifications to existing projectors.

With either type of system, it is as well not to rely purely on memory [illegible] deciding when to change to s[illegible] either the pictures or the music runs out before the other, the result can be

The heart of the system *The Kodak Carousel slide projector forms the basis of most professional A–V presentation systems for single twin or multiple projection*

Good organization *is vital to a successful A–V presentation especially when using two projectors. All the slides must be numbered, with even numbers in one tray, and odd in the other*

[illegible] Variations in p[illegible]ying time are not [illegible] to be significant over a few minutes.

When you buy a fully-automatic system, you can either choose all your equipment from one manufacturer or choose various components from different manufacturers. By choosing the first alternative you will ensure that all the equipment you buy will be compatible but the drawbacks are that you may have to keep a particular projector or other piece of equipment that you do not like, and that you may have difficulty in upgrading your equipment later. The second alternative means you must ensure that all the items of equipment are compatible. This you can do by asking dealers, but often they will not know the answers, so you will need to write to the manufacturers.

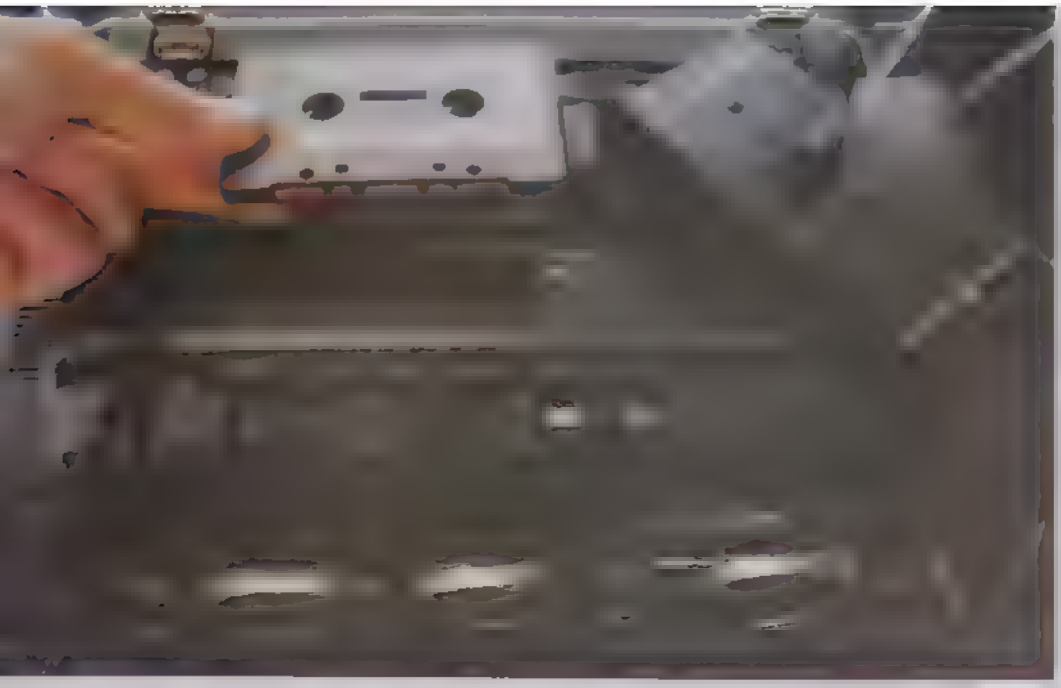
Usually, you need three groups of equipment: the projector or projectors, the tape deck and sound system, and the control unit (also known as *dissolve unit*, *program unit*, or *programmer*; some control units have a built-in tape deck).

Projectors

At the heart of the A–V system is the projector, which should perform several tasks. The projector should be able to accept the control information. Almost

Remote control projector *Using just one projector you can learn the basics of A–V work before you go on to more sophisticated arrangements*

Dave King equipment courtesy of the Widescreen C



All in one [illegible] extra head for the pu[illegible]

The tape deck/sound system

differ[illegible] the duration is not [illegible] important, provided it is n[illegible] it initiates two changes

For twin-projector control, dif[illegible] types of pulses are required to ini[illegible] fades of different durations or change[illegible] There are three ways of encoding th[illegible] information, by frequency variation, by variation of the length of the tone, and by using a continuous modulated tone The first two types usually limit changes to

Purpose built *recorder and encoder. This model plays in stereo but has an extra head for the signals for the dissolve unit, plus other useful A–V features*

The control unit

Wide-screen projection *is possible by fitting a special panoramic lens over the projector lens, but the slide shots most suitable have been taken with a similar lens*

erent

ing. With the magazines in the projectors set to zero and the tape

A professional A–V set-up *includes twin projectors and dissolve unit, speakers for the sound track, and a variable screen for normal and wide-screen projection*

Heat treatment

If you take your camera with you to hot sunny places, your equipment and film may suffer the mechanical equivalent of heatstroke. But you can avoid this with a little planning and preparation

Hot weather, brilliant sunshine and an exotic location may sound like the ingredients for a photographer's paradise But very hot weather causes a great many problems as well, particularly with equipment and film Unless you take great care, you may find many of your pictures ruined by equipment failure or film damage caused by sand, dust, moisture, dryness or just pure heat

The problems vary according to the climate. On top of the basic problems caused by heat and light, each type of climate causes its own additional complications. The dampness of an equatorial rain forest creates a different set of difficulties from the dry heat of the Arizona desert

Equipment selection

Although your equipment seems to work normally even in moderately hot weather, in very hot weather you may find that even simple things, like the black finish on the camera, cause trouble Indeed, all black surfaces—on cameras, lenses and camera cases—heat up very quickly in bright sunshine This is made worse when the temperature of the surrounding air is already very high As a result, anything inside also heats up, and with cameras and lenses this causes mechanical problems

Dusty dunes *This sort of landscape may look very attractive, but the dry, hot, dust-laden atmosphere can creat havoc with your film and equipment*

At the very least, the movements of focusing, aperture and shutter speed rings tend to become rougher as various parts of the mechanisms expand differently. With some lenses this is more than compensated for on focusing and zoom rings by the thinning of the lubricants. In fact, the oil may become so thin that the movement is slack. It is not unknown for the zoom setting on a one-touch zoom to move when the lens is pointed steeply upwards or downwards If you are planning on a long stay in a very hot place it may be worth consulting a good repairer or manufacturer's service department about the possibility of having the normal lubricants replaced by heavier ones

Shutters are also prone to faults. Even if the heat does not affect them, it is worth remembering that shutters are particularly prone to inaccuracies at the high shutter speeds you may be using in bright sunshine. Even in expensive cameras a setting of 1/1000 second can actually be as slow as 1/650 second This could give 2/3 stop overexposure

It is worth having your shutters checked by a repairer before you go so that if the speeds are wrong you can allow for this when exposing It is also a good idea to bracket exposures Fully electronic shutters are usually much more accurate than mechanical ones, as

Morning light *You can avoid many of the problems of hot climates by shooting early in the morning when it is still quite cool and the lighting is not too harsh*

When p[illegible] quality [illegible] you are then [illegible] blems such [illegible] Because of the very bright hazing light which you are [illegible] is wise to use many coated filters which help to reduce flare. And you should always use lens hoods for the same reason.

Take as little equipment as possible. A [illegible] which seems reasonably light [illegible] they are heavy when you [illegible] carry them [illegible]

The camera case can also be important. When you are [illegible] best to use [illegible] But if [illegible] metal case is better [illegible] protection. The case should be silver or white [illegible] heat absorption. Black or dark cases can be spray painted [illegible] and basketed cases such as the Hamburton keep out moisture and dust better than other types. In moist conditions however avoid using foam lined cases as the foam stores moisture and encourages corrosion.

Taking care of equipment

Never leave equipment lying in direct sunlight even if it is in a camera bag. If you have to leave the gear for a while though this should be avoided possible - do not put it in the car compartment or on the parcel shelf. The safest places are under a light coat, a blanket or thrown in the footwell in shaded seat. Try to park the car in some leafy spot but remember that the sun moves quite quickly and your shady spot can soon become an exposed furnace.

Be careful when picking up cameras and lenses. They may be quite hot and not exactly too hot to hold the shock might cause you to drop them. In places where it is very hot [illegible] the day the temperature may be quite [illegible] night. So if you have made [illegible] shoot at dusk place [illegible] them [illegible] overnight.

In dry places dust is [illegible] hazard. If metal lens [illegible] as possible [illegible] shutter and lens mechanism. You should clean your equipment [illegible] as [illegible] Dust off sprays are not very useful [illegible] aerosols do not perform [illegible] be carried on planes and in very hot temperatures the pressurised cans can

Taped zoom *One-touch zoom controls become very loose in hot weather, so if the lens is placed at an angle the zoom control may need to be taped in the right position to stop it moving*

Pays Kingfisher courtesy [illegible]

Cool box *Picnic boxes are good for keeping film cool, though the rolls should be kept in plastic bags to exclude moisture. To get more film in, take the rolls out of their boxes first*

Hard hoop

Taking care of film

Taped back *If there is a lot of dust, put tape over all the places where the dust could get in. But first, remove any dust or grit which is already on the camera using a large blower brush*

Oiled thread *Dust can easily get into filter threads jamming the filter on to the lens. To avoid this problem, lightly oil the filter threads before use with the help of a toothpick or cotton bud*

Distant haze *Heat haze can be a problem, especially around midday when the sun is hottest, and can be obtrusive especially if you use long lenses*

Kodachrome

very m

able. All

With 120 films, put the

sealable plastic bag

del But

already be

When film emu

easily damaged Any

must be

static is a problem

marks all over your film To

wind and rewind the film

motor wind almost guarantees some degree of static, so avoid them

Care needs to be taken too when loading and unloading films because of the

Shooting the pictures

The

contrast With black and white film this can be reduced by suitable processing but with colour work you have to do something about it when shooting

One of the best ideas is to use fill-in flash This should ideally be slightly filtered

and is

same

This is

FM2 which has

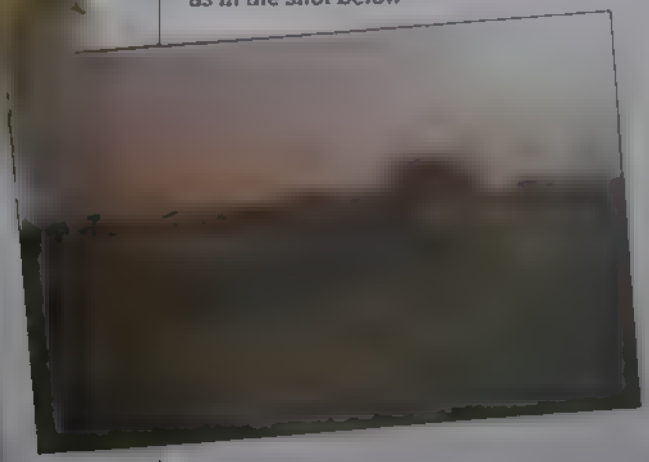
second, have an advantage

Amongst many

reflectors the most convenient

being those made of foil These fold up very small and usually have one silver side and one gold side the latter being useful for warm shadows

In general the best times of day to shoot are early morning and late afternoon when the colour is better and the sun is lower giving your subject more shape The early morning air is reasonably cool and so does not suffer from heat haze which can be a problem with long lenses when the land has warmed up. Midday sun in the tropics is extremely fierce, and you and your cameras are better off indoors



Bright light *You should always load cameras in the shade, even if it is only the shade of your own body (left). Otherwise light may get into the cassette through the velvet light trap and fog the first few frames, as in the shot below*

World of photography

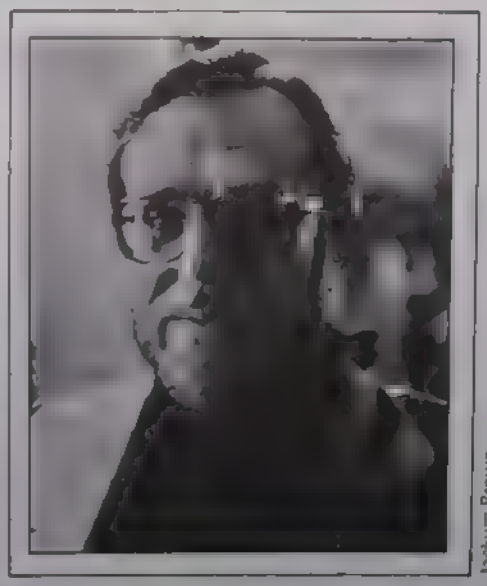
John de Visser

Although his work takes him all over the world, photographer John de Visser always prefers to return to his favourite subject—Canadian life and landscape

From the [illegible] of the [illegible] the [illegible] of the [illegible] spectacu[illegible] world. It [illegible] photograph[illegible] paradise. But we have [illegible] the [illegible] de Visser.

Yet there is more to de Visser's work than superb Canadian landscapes. In over 25 years as a professional photographer he has successfully covered assignments on everything from coal mines to social documentary. Although the Canadian landscape is immensely photogenic, he feels there is more to his success than this.

'As far as I'm concerned there's a picture to be had anywhere. It's a terrible cliché, but it's true. You don't need to go further than your own back yard to find a whole range of subjects. One of the few things you have to learn as a professional photographer is how to make a picture of anything.'



Jackum Brown

John de Visser *Although he was born and brought up in Holland, de Visser now regards Canada as his real home*

Nevertheless, de Visser is [illegible] home in the vastness of [illegible] landscape and although he [illegible] and wide over the world, he is always keen to return to the country he loves.

As he says, 'I think it is probably the single greatest country in the world—both in its variety of scenery and its natural resources and riches. Because there are so few people you've got plenty of space to live in. Perhaps I particularly like it because I was brought up in Holland which is the most densely populated country in the world and I found it very claustrophobic.

It is this feeling of vast open space that seems to run through de Visser's landscape shots. Even when de Visser introduces people into his photographs they are likely to be tiny figures dwarfed by the sheer scale of the landscape.

Although de Visser is now famous for his photography, when he first went to Canada he earned his living at practically everything but photography

Yukagir family, Siberia *Part of a small tribe of nomadic reindeer herders living on the shores of the Arctic in Siberia*

Glimpses of royalty *Small children squeeze under the seats reserved for senior citizens on the Royal Tour of Canada in 1973*

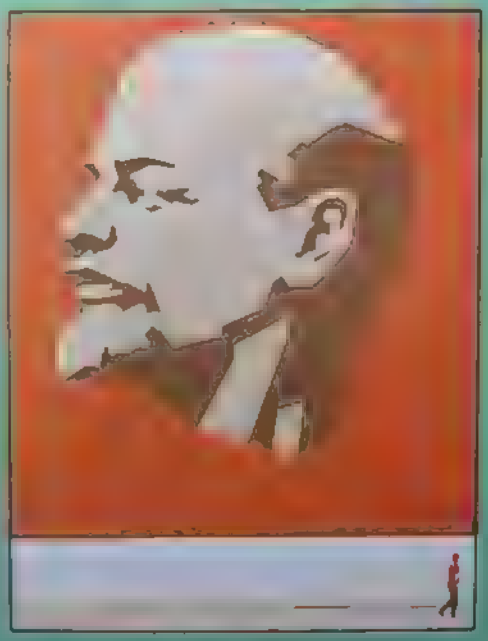
The bride *(left) Traditional painting on the hands of an Indian bride, taken on assignment for the Indian Tourist Agency*

However, at the age of 24, two years after he arrived there, he visited the Niagara Falls with a Box Brownie. He was delighted when the man at the local camera shop told him that the pictures he brought back were some of the best he had ever seen. Thus encouraged, his enthusiasm for photography grew and has remained strong ever since.

Right from the beginning he concentrated on colour photography, spending every extra dollar on his new hobby. Then in 1957, at a time when his photography was already filling every spare moment, he took some pictures he had shot in and around Toronto into the [illegible] *Macleans*—Canada's biggest

Recycling *Crushed beer cartons make a distinctive sight at a white paper mill. Taken to illustrate company report*

Moscow, 1971 *A visitor is dwarfed by a giant mural of the Soviet Union's founding father, Lenin, at the National Exhibition*



[illegible] Film Board of Canada's [illegible] celebrate Canada's centennial year of 1967. He had already done a number of commissions for the Canadian government tourist bureaus, but this project was different. He was to be fully credited and the book promised to be a major showplace for his work. The director of the project, Lorraine Moffatt, selected landscapes from some of Canada's leading photographers. And then she commissioned

[illegible] several of them [illegible] the country [illegible] featured in the [illegible] tasted on and [illegible] and cost a total of $[illegible] end it was the [illegible] make money. The [illegible] called *Canada* [illegible] still on sale over [illegible]

But for de Visser [illegible] just a marvelous [illegible] but a refreshing [illegible] in photography. The [illegible] were given fairly [illegible] where and what they [illegible] and given complete freedom [illegible] this in the way they wanted.

De Visser's work for [illegible] other important [illegible] experience in publishing [illegible] provided the basis for him [illegible] number of books of his [illegible] confirmed in him a deep [illegible]

Bombay market *An attractive array of s[illegible] under [illegible] sunlight on a street [illegible] in Indi[illegible]*

West Indian schoolgirl [illegible]

Lake Nipissing *Taken for a video using film and stills to celebrate the Ontario Northland Railway's Centenary in 1982*

[illegible] project. This was to be called *Between Friends—Entre Amis* and was Canada's official gift to the people of the United States on the occasion of their bicentennial.

The idea was to look at the 100 mile stretch either side of the border between Canada and the USA. 'I made one major trip for it starting in Northern Ontario and worked my way all the way over to British Columbia photographing as I went. It was a marvellous assignment as I could do whatever I wanted.

[illegible] complete range. I may use them all at one time or another but I prefer to take the [illegible] mm lens if I want to capture a sense of space, or when I'm photographing architecture. Another of my favourites is the 135 mm lens.'

De Visser does not use many extras although he carries a tripod and occasionally uses a warming filter, especially in the Arctic. Like most professionals, he shoots a lot of film but tends to bracket his exposures only when the situation is dubious. 'I should perhaps bracket more. Even half a stop can make the difference between a good, and a much better, picture.'

Travelling in the far north of Canada also provides de Visser with a variety of technical challenges. [illegible] occasion [illegible] freeze his camera [illegible] retreat indoors to warm [illegible] cold is not just a physical [illegible] can seriously affect the [illegible] film and equipment. He has [illegible] winterized [illegible] Arctic by rebuilding the [illegible] And he takes care to keep his [illegible] and film as warm as possible.

He [illegible] building an [illegible] the temperature [illegible] The 50 km/h [illegible] effective temperature [illegible] below zero [illegible] rewind his film he found [illegible] disintegrated.

However, his experiences [illegible] Arctic proved helpful on two [illegible] trips he made around Russia. The [illegible] these was with Farley Mowat [illegible] toured the far reaches of Siberia [illegible] to some places that had never [illegible] been visited by Western journalists. [illegible] second was [illegible] Canada's premier Pierre Trudeau. As de Visser says, 'One of the great benefits of this profession is that you have such great opportunities. On that trip we visited Samarkand, one of the old [illegible] cities of mankind. I had just [illegible] Marlowe's *Tamberlaine* and to [illegible] myself in Tamberlaine's tomb was an [illegible]

Shadows *An [illegible] Cenotaph taken for a [illegible] by the National Film Board of C[illegible]*

Dawn landscape *De Visser took this image as part of a series of photographs for a book about south western Ontario*

Video cameras

As more and more amateurs turn to video in place of home movies, electronic cameras are becoming increasingly common. So how do video cameras produce their images, and what are their limitations?

[illegible] cameras of the television [illegible] own vehicles seemed little to do with home movie making. But over the last ten years the video revolution has been gathering momentum and now video cameras no bigger [illegible] rivals have become widely available for amateur use. Indeed, the video camera, with its instant playback facility and its ability to shoot for hours on end, may soon take over from movie film cameras altogether.

The idea of the video camera dates back to 1908 when the British scientist Alan Campbell Swinton suggested the possibility of an all electronic rather than film based moving picture system. But more than 20 years elapsed before television technology had developed sufficiently far, with the invention of the *Iconoscope*, for the theory to be put into practice. The Iconoscope, invented by Vladimir Zworykin, a Russian emigrant working in the United States, has proved to be the basis of nearly all modern video cameras. Indeed, the EMI-developed camera used by the British Broadcasting Corporation for the first regular TV broadcasts in 1936 was very similar to the original Iconoscope. Since then, many refinements have been made but, with a few exceptions, the basic principles remain the same.

Pick-up tube

[illegible]

pick up tube is of the *vidicon* type first introduced by RCA for industrial use in 1952. Other names have appeared since then such as the Saticon and the Trinicon, but these tubes are merely variations of the original vidicon.

The vidicon consists of a glass cylinder with a light sensitive target at the front and a gun for firing a beam of electrons at the back. It works rather like a TV tube (see page 1841) but in reverse. Like certain light meters, the electrical conductivity of the sensitive front surface varies according to the intensity of light falling upon it. So a pattern of electrical conductivity is produced at the front surface that corresponds to the brightness of every part of the scene. The electron beam from the gun at the back of the tube scans line by line across this pattern rapidly to release a series of electrical charges that flow out as a *video signal*. The voltage of this signal varies according to the brightness *(luminance)* of the original scene.

Most video cameras nowadays, however, are colour, and for colour, the light must be separated into its red, green and blue components [illegible] three pick up [illegible] appropriate colour. In the majority of amateur cameras however, only one tube is used and colour separation is achieved with a single filter of very fine coloured stripes.

A video signal must carry more than luminance and colour *(chrominance)* information because the picture must be reassembled on the screen in the way they were recorded. To achieve this, synchronizing pulses are added to the signal—these are the equivalent of the perforations in movie film. The resulting signal is known as *composite video*.

The strength of the video signal is controlled in two ways. First, the amount of light actually reaching the pick-up tube is controlled with an iris diaphragm. On most cameras this is automatic, though it can be operated manually. It works by comparing the voltage of the video signal (which is a measure of light coming through the lens) with a reference voltage and then making appropriate adjustments. If the compensation is more than this iris can give, an automatic gain control (AGC) comes into operation to restrict the voltage of the signal. There may also be a switch to provide an extra voltage boost for low light work but this can make the picture rather noisy [illegible] lat to a grainy film.

The range of light that a camera can work in is quoted in lux, and is normally between 100 and 100 000 lux. This means that it can cope with a range from a [illegible] ably well lit room to a bri[illegible] sunny day. Sensitivity is increasing, however and there are now amateur cameras that will work at 50 lux or less and give acceptable pictures in brightly lit streets at night.

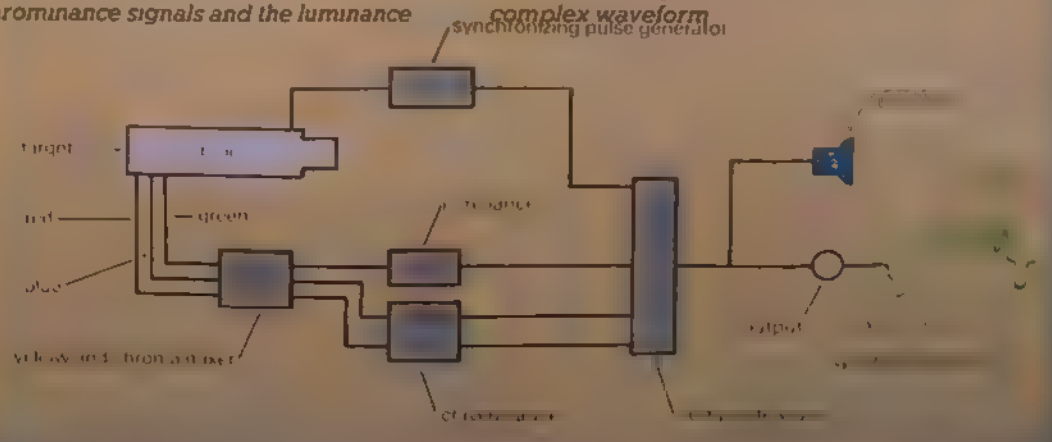
The viewfinder

All modern amateur cameras have an *electronic viewfinder*—a small monochrome television screen with a magnifier. This can be used for framing, focusing, and checking picture quality.

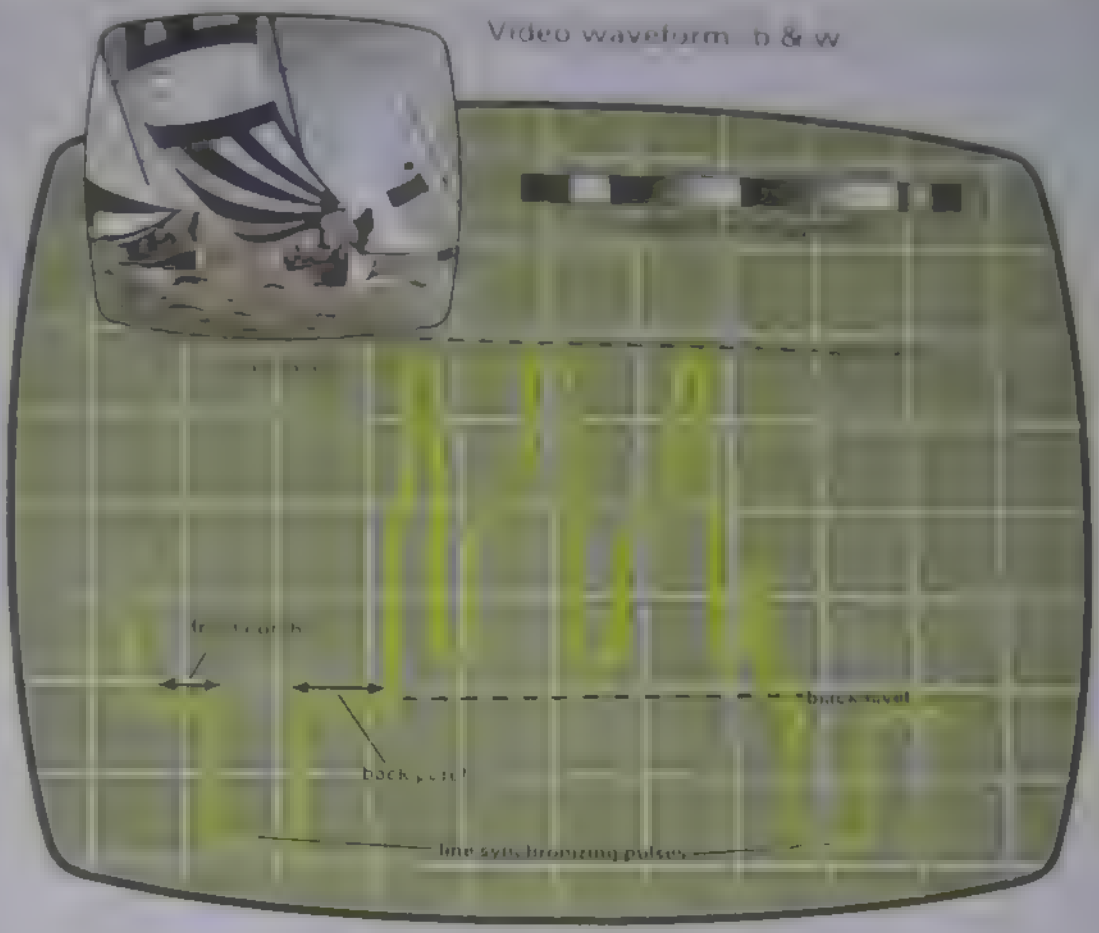
Unfortunately, this screen cannot be used for colour checks because conventional colour television needs a *shadowmask*. This is a mask with many perforations which is set immediately behind the screen. Perforations are in sets of three, each angled to accept the electron beam only from one of the three

Single tube video

The camera has red, green and blue output signals. These are processed into two chrominance signals and the luminance signal. With the sync pulse added, the result is the video output, which has a very complex waveform.



Waveform *Each line of a black and white [illegible] strength between a black level and a white level. At the beginning of each line there is a sync pulse which is separated from the scan lines by a 'front and back porch'. These give the scan signals time to die away and rise again*



guns needed for a colour image. While this pattern is not noticeable on large screens, it would be very obvious on the small screen needed for a viewfinder. Adjustments to the colour balance for various lighting conditions are made in one of two ways. Gross adjustments are usually made with built-in filters. Fine adjustments are made with a special tint control.

Video film

There are clearly some fundamental differences between video and film cameras. The most obvious is the way the video image is built up. To build up the screen image the electron gun scans across the screen in a series of lines—usually 625 or 525—like following lines in a book with a pen. But instead of scanning every single line, it scans every other line on one passage and then fills in the gaps on a return passage. The idea of this doubling up is to give a faster framing rate, at 50 per second, without having to provide any more picture information. This means that the video image is very flicker free compared with movie film.

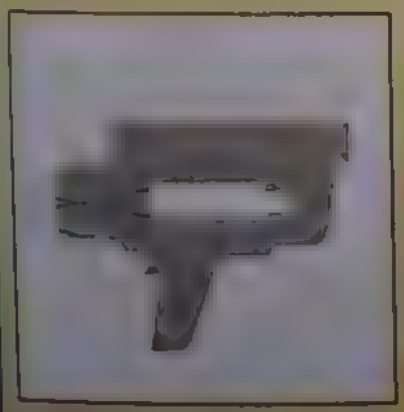
However, the limited number of lines means that resolution is very poor compared with film. Recently, though, some manufacturers, particularly in Japan and the United States, have been experimenting with various 1125 line, *high definition* systems which are claimed to give resolution as good as 35 mm film. However, these have their own problems and may prove suitable for specialist use only.

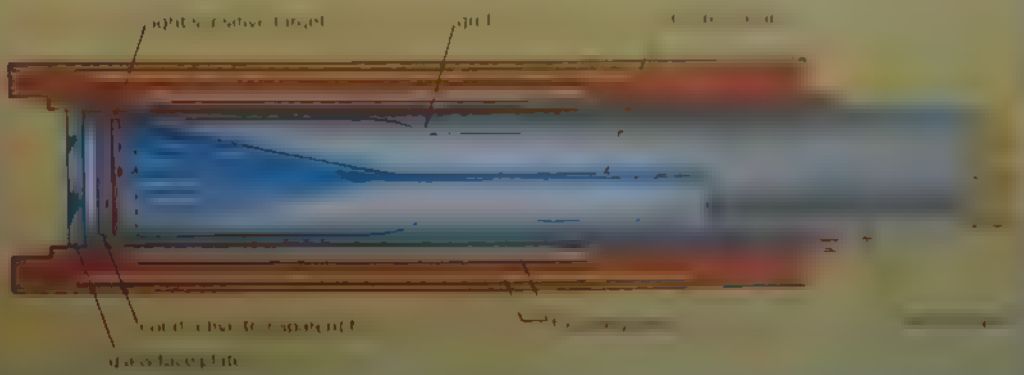
Video also has a more limited contrast range so that highlight and shadow areas contain less detail than they would on film. Small highlights also tend to leave trails behind them if the camera is moved. In low light, on the other hand, a person moving across the frame appears ghostly because the static background tends to 'stick' under those conditions.

Modified vidicons do improve on the performance, with moderate success. But the future lies with solid state imaging in the shape of the *charge coupled device* (CCD). This is very much smaller since it is a tiny electronic chip. It is also less susceptible to physical shocks and burning by bright lights—video camera operators are always warned about aiming their cameras at bright lights. So when cameras are combined with micro video recorders by the middle of the 1980s, the CCD will almost certainly be an important component.

Vidicon tube

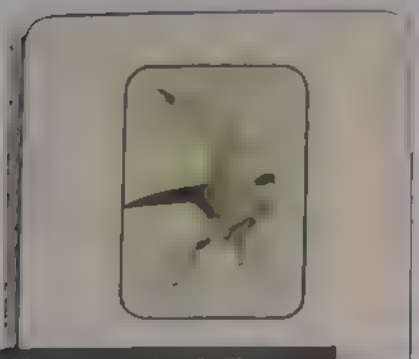
The image is formed as a conductive pattern in the photoconductive layer. This is scanned by an electron beam which is focused by the coils and accelerated by the charged grid plates. The electrons which the target accepts form the output current, which varies in strength with the image brightness

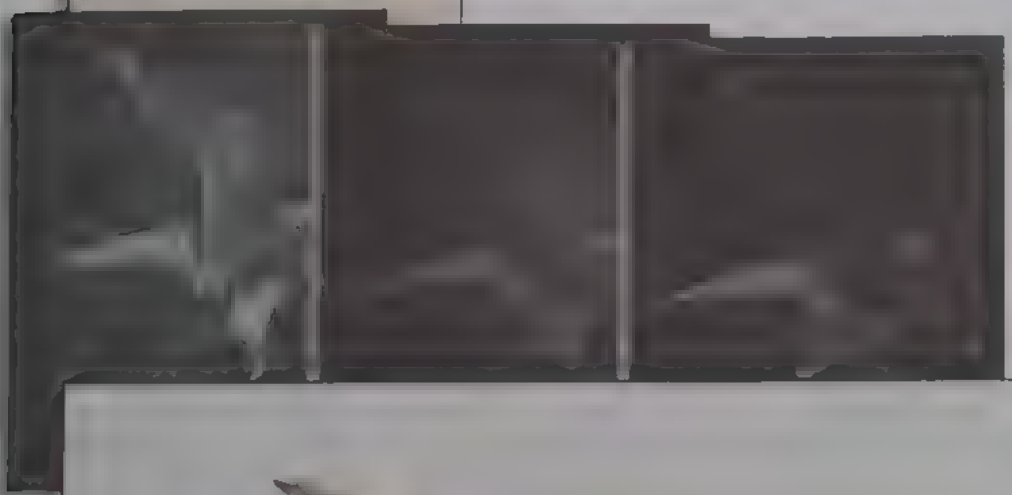




MAKING COLOUR SEPARATIONS

Colour separation—the splitting up of a coloured original into its blue, green and red components—is an essential part of many high quality colour printing and derivation techniques





Artwork by Terence Lambert

[illegible] just three [illegible] photographers [illegible] or with [illegible] colour printing. And [illegible] basic technique is used in the [illegible] industry to make the half tone [illegible]ative for colour reproduction in [illegible] and books. In all cases the three different versions of the same image are called *colour separations*, and are monochrome images made using carefully selected colour filters which divide up the spectrum between them.

Choosing the filters

The three filters are known as a *separation set* and are always blue, green and red. A variety of separation sets are [illegible]lable for different purposes and it is important not to mix filters from different sets. For example, if the original is a [illegible]lour transparency, its three colour [illegible]ers overlap slightly in transmission [illegible] can be seen from the spectral transmittance (see page 1971). To prevent [illegible], the green separation filter from recording a little of the cyan image you should use a *narrow cut* filter set when making separations. These filters transmit light in narrow bands of the spectrum, right in the middle of the wide bands of colour absorption of the transparency. Other filters may not have such narrow transmission bands, and separations made using filters chosen from different sets could give odd unusual results.

In practice, one set of filters will do for

Three colour split *If you want a really high quality reproduction of, say, a fine painting, you may be tempted to make a dye transfer print or, for less cost, a top quality additive colour print. For either of these methods you will need a set of colour separations exposed through blue, green or red filters and subsequently printed through these to make the final coloured print*

most pur[illegible]
not be perfe[illegible]

[illegible] cut filter[illegible] additionally
dichroic filters used in e[illegible]
designed for additive printing m[illegible]
suitable for exposing the separation

When making separations through filters the exposure must be increase[illegible] compared with that using no filt[illegible] usually expressed as a numeri[illegible] factor by which you multiply the origina[illegible] exposure Ideally the filter factor ought to be measured for each filter you [illegible] making a series of exp[illegible] standard grey scales and me[illegible] resulting image de[illegible] sitometer But most [illegible] ers do not normally [illegible] such equipment, and in prac[illegible] get fairly good results [illegible] factors supplied with [illegible] published by the manuf[illegible]

Making the separations

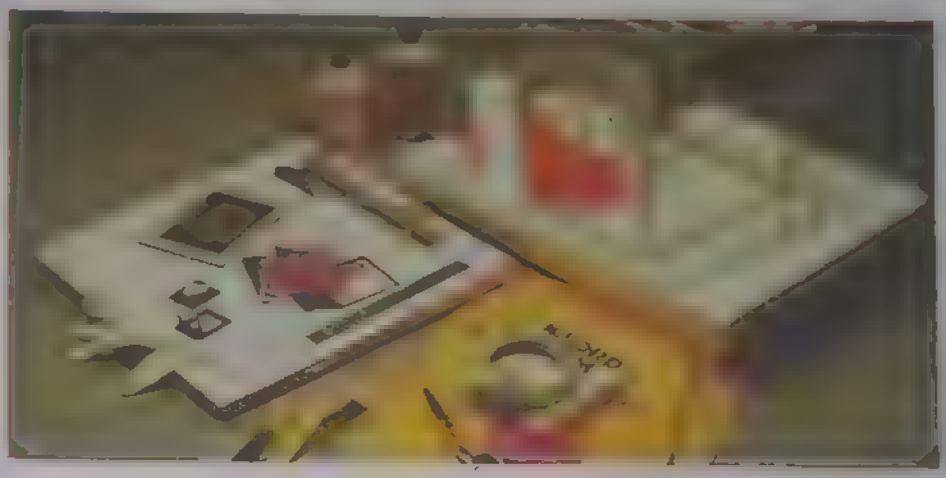
You can make a separation ne[illegible] any kind of original—tran[illegible] artwork, flat copy or [illegible] scene [illegible] from a transpar[illegible] you make separations [illegible] establis[illegible] factor [illegible] your original contains a sta[illegible] scale It is a good idea to tak[illegible] shots for this very [illegible] perhaps a sn[illegible] ing a standard gr[illegible] photo dealers [illegible] running from pure [illegible] so it enables you to see h[illegible] is varying as well as the exposure If you prefer, you could tape a *transmission scale* to the edge of the original slide This is on a film base rather than paper, but is used in the same way

Ideally, you should measure the grey scales on your final separations using a densitometer But it is possible to check the results by a visual comparison, and you should be able to see quite easily if there are any variations in exposure or contrast that should be put right

Separation negatives must be made on panchromatic film The scale on which you make them depends on the use to which they will be put. For copy purposes, the 35 mm format may be adequate if you do not have a bigger enlarger, but if possible you should work with a larger format Special separation film, such as Kodak Separation Negative Film 4133, Type 2, is available, but satisfactory results may be obtained with ordinary pan film

When making a set of separation negatives from a colour transparency, not only should you give a separate exposure through each filter but you should [illegible] develop each negative [illegible] to allow you to contr[illegible] the [illegible] For this reason even if you are [illegible] it is preferable to [illegible] negative [illegible] sheet film [illegible]

Separations from a colour transparency



1 To make large, high quality colour separations for contact printing, the following items will be useful: transmission and reflection types of grey scale (Kodak); punch register, separation filters; sheet film with matched developer; dishes for large sheet processing, or a deep tank if you prefer. Use an enlarger of as large a format as possible

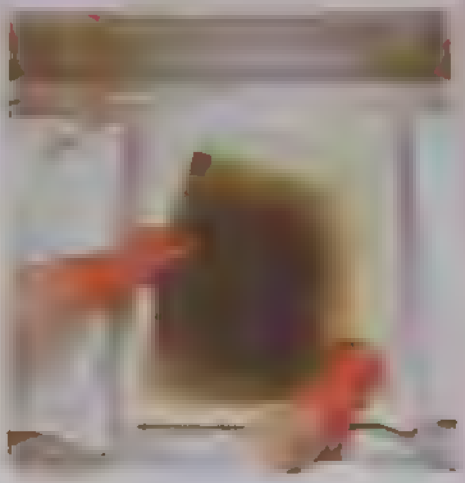
2 You can work from a copy slide of the original and grey scale combined. Or tape a transmission grey scale carefully to the edge of your original slide

3 This shows the projected image. Line up the pin bar and fix this to the easel using double-sided tape. Position this in relation to the sheet film

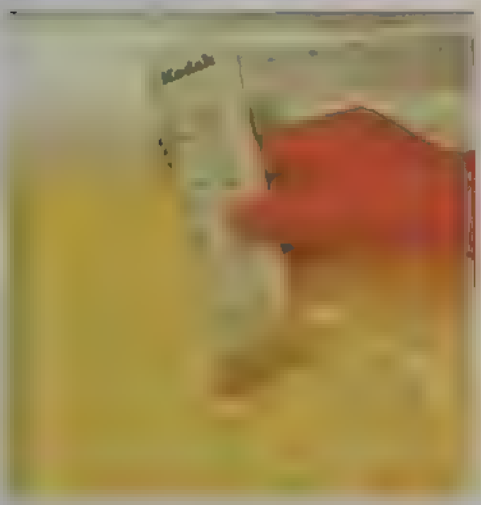
4 The sheet film area should be large enough to accommodate the grey scale beyond the actual image area. Cut a piece of black paper to act as film backing

5 Expose the red colour separation first, using a Wratten 29 filter, in darkness. Use a test sequence to establish exposure Put the film aside in a suitable dark store

6 *Check the temperature of the developer, in darkness, before commencing the film processing sequence. Exactly the same procedure must be used for each film sheet*



7 *Carefully steer the film sheet first through the developer, then stop bath and fixer prior to inspection. If exposure is wrong, make another negative*



8 *In turn, expose the green (Wratten 61) and blue (Wratten 47B) separations. On each occasion, check the developer temperature before beginning development*

9 *Because processing in dishes involves working part of the time in darkness, you may prefer to use lidded deep tanks—but this restricts the size of contact negatives*

10 *For really accurate separations, not only should the three negatives match each other in density and contrast, but selected tones should correspond with the original*

11 *Large size separations are easy to contact print in register—the same pin set-up can be used. Here an additive test print is being made to red light*

[illegible]

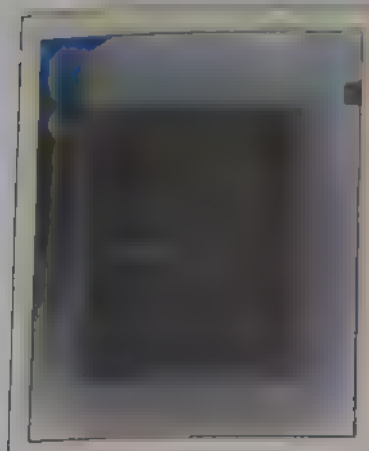
[illegible]

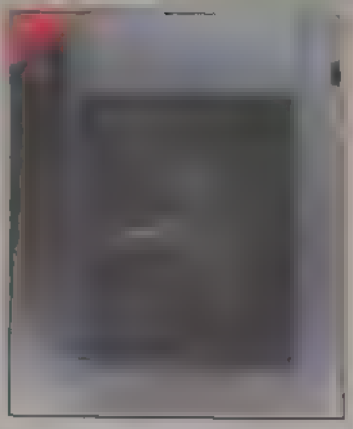
Kodak recommend that with the Wratten [illegible] separations [illegible] Wratten [illegible] and 47B [illegible] three of us [illegible] they. This [illegible] standard [illegible] aperture [illegible] emulsion, but you can use [illegible] as a starting point for your own [illegible]

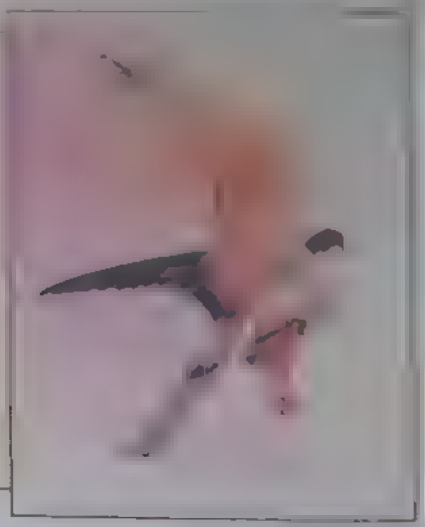
Processing separation negatives

The three exposed negatives should be developed together at the same time in fresh developer, for consistent results. But you will probably need to adjust the development time for each separation in order to give a uniform contrast, so you must make sure that you can identify each one in the dark. One way to do this is to process them in a deep tank using wire hangers which you mark in some way along the top edge, such as by fastening twists of wire to each one, in the same sequence as your corner cutting. The developer you use may be your standard film developer, but it is common to use a fairly active developer such as Kodak HC-110—though DK-50 or D76 could be used instead.

Again, there are Kodak recommended development times, which apply to their







separation negative material in HC-110 at dilution B These are 4½ minute[illegible] for the red and green negatives and [illegible] minutes for the blue It is worth giving the same relative development times to your material, as a starting point before assessing the results

Assessment

The professional way to check that the exposures and development are correct is to measure the densities (see page 1518) of the patches on the grey scale which you photographed, plot them out on graph paper against their known density, then adjust exposure and development so that the three scales match as closely as possible

In the absence of a densitometer, you can compare the scales on your negatives visually on a lightbox It is useful when doing this to cut a hole in a piece of black paper just the size of one of the patches on the negative, so that you are not misled by the contrast with other patches This may be rather tricky if your original is 35 mm size, however

You can actually make reasonably accurate density estimates if you buy a Kodak Photographic Step Tablet, Type 2 or Type 3 (which is the larger). This has 21 steps which you view by transmitted light, varying from clear base (density 0 05) to dense film (3 05) in steps of 0.15 These are nominal figures only, but they are close enough for most purposes

Kodak recommend that in a good separation negative, a dense part of the transparency, with a density of 3 0, should reproduce on the negative at a density of 0 35 to 0.4 You can check this by comparison using a step tablet

Ideally, all three grey scales should be identical. If they do not match, first repeat the set with corrected exposures so as to get detail in the denser parts of the transparency The second step of the grey scale should just be visible above the base density Having done this, you can compare the scales for contrast All three scales should get progressively darker at the same rate, and the last

[illegible]

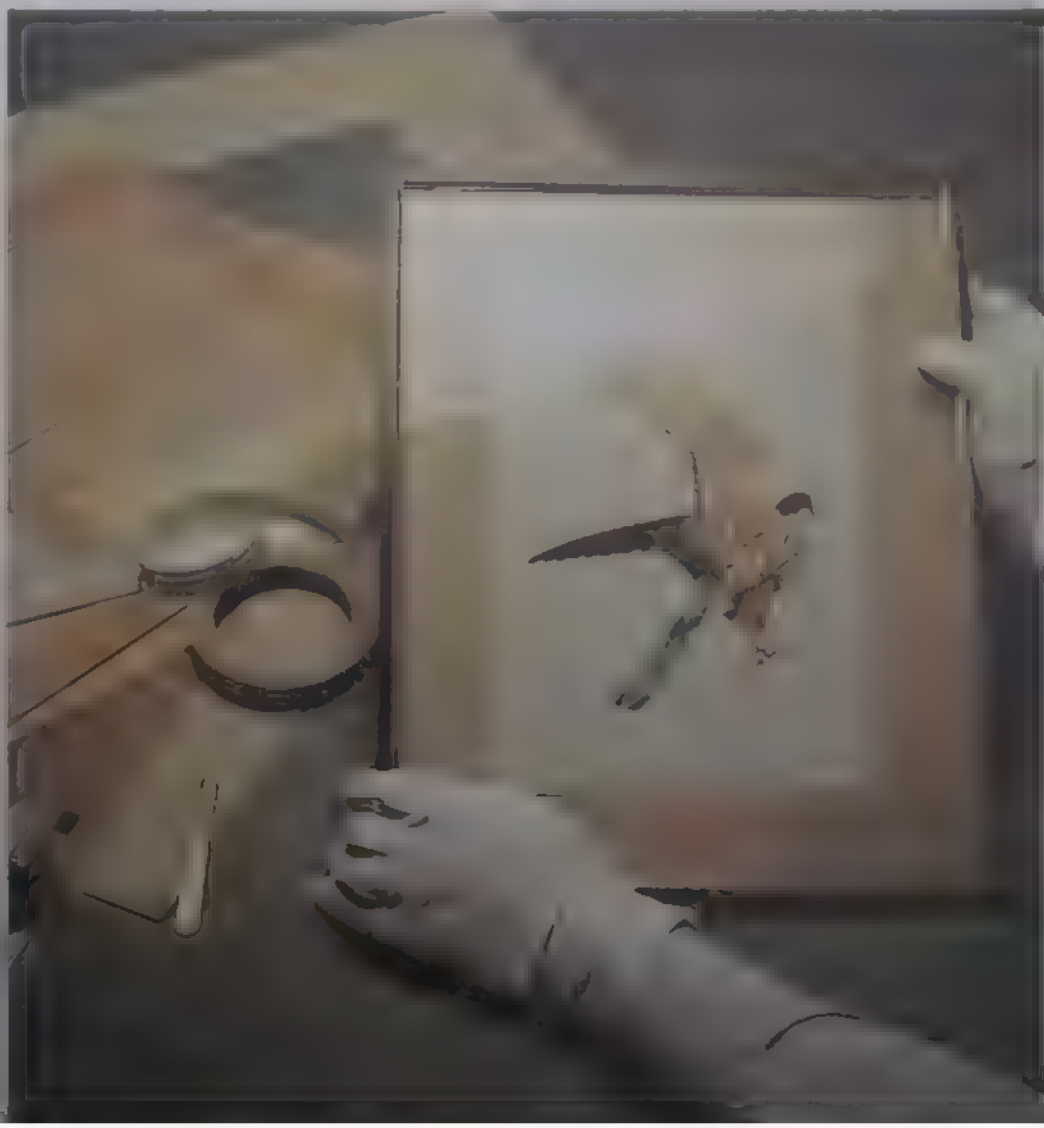
Y[illegible] may find t[illegible] you arr[illegible] and [illegible] the [illegible]arting point [illegible]et good re[illegible] you [illegible] deve[illegible]

Having [illegible] standard [illegible]sure al[illegible] sequence [illegible] particular [illegible]th sp[illegible] You can also mak[illegible]eparatic[illegible] the camera d[illegible]ctly from a static subject, by makin[illegible]eparate exposu[illegible]

Fault *By comparing the step tones at the side of the separations, it is possible to isolate development and exposure faults—here, in the green separation negative*

through the different filters [illegible]on or finally b & [illegible] panchromatic film

In this case, you mu[illegible] rigidly as possible and use a filter [illegible] in front of the lens Exposures are v[illegible] in the same way as for enlarger work though your exposure times are briefer Make all three exposures as quickly as possible to avoid changes in lighting If you wish to give separate development to each negative, allow a frame space between each negative



Final result *Careful adjustment to the original and final exposures of colour separation negatives can be used to make minor colour and contrast alterations*

Creative approach

Graphic images

Developing a good sense of graphic design can help you to create much stronger impact in your photographs—it also teaches you to be much more selective about what to include in the frame

[illegible] designing and organizing an [illegible] group of images to make it as [illegible]tive as possible. This is vital in [illegible] or magazine production but it is also a very important part of the picture taking process. For a photograph to look [illegible] like a magazine design, all the elements of the picture must work together to present the image clearly and effectively.

[illegible] photo lenses. With a telephoto it is possible to isolate details in the city—the patterns of the cars stuck in a traffic jam, the reflections in the skyscraper windows, the neon lights or the shapes created by the ebb and flow of shoppers. While detail and information is lost, pictures may be far stronger and have far more impact. Indeed, the simplest

[illegible] lettering at fair [illegible] arcades [illegible] even a subject as s[illegible] bench standing out ag[illegible] ground, are all example[illegible] subjects that are ofte[illegible] material for graphic [illegible] confronted with such [illegible] experiment with angling the [illegible] itself so that a horizontal bec[illegible] diagonal, this may help you define pute

Building *Diagonal lines give an image a dynamic quality, so it is often worth composing a shot to exploit this. Here the photographer chose a low viewpoint to create these shapes*

Solitary figure *Simplicity is one of the keys to good graphic images. This is achieved by reducing the scene to the bare essentials*

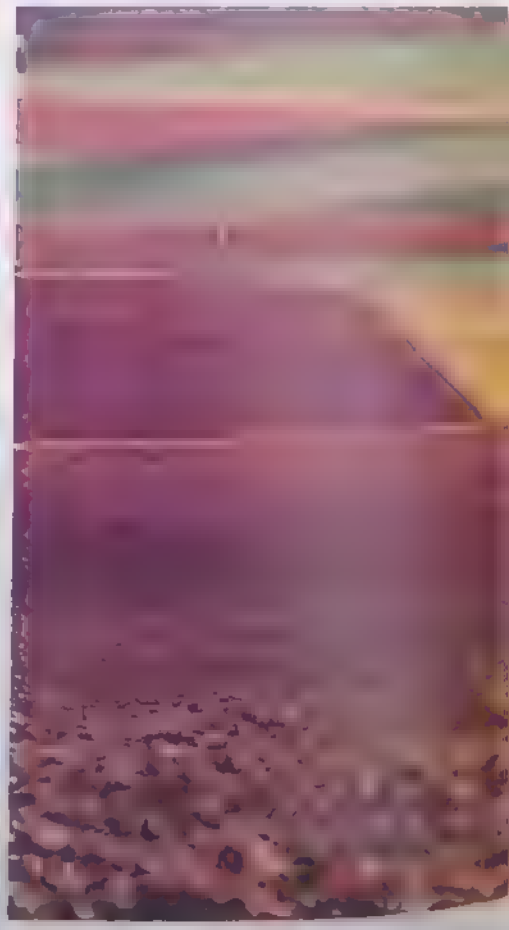
Foot *Often, the apparent simplicity of a graphic image is misleading but in fact a great deal of thought and effort goes into an image that relies primarily on strong composition like this*

attention
diagonals in a shot can give it a
feeling of movement

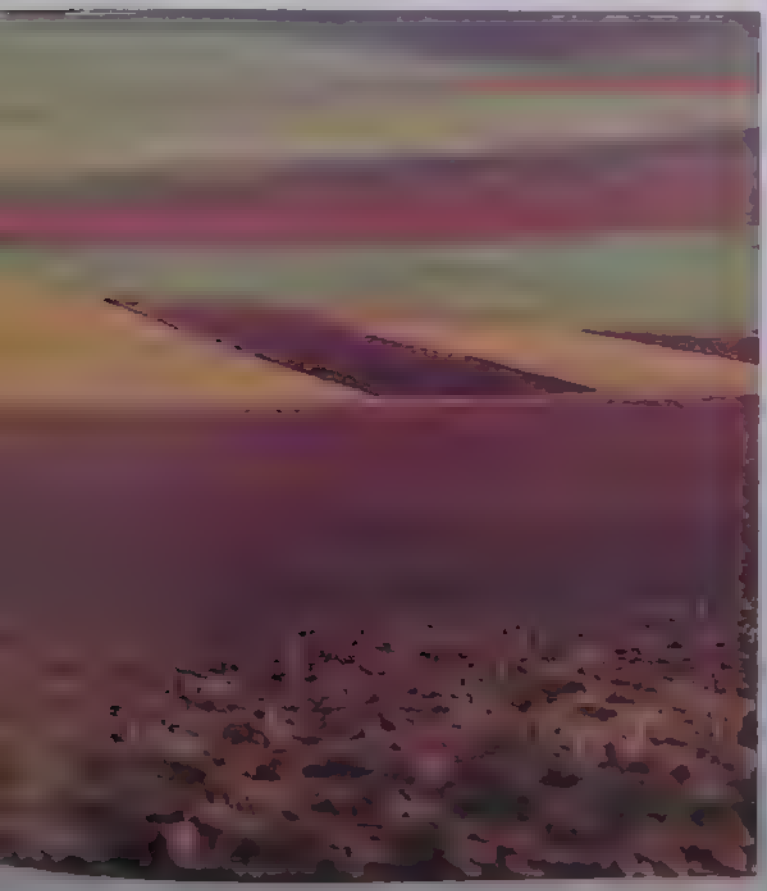
Careful balancing of the elen
shot will give the opposite
dynamism and instill a mood of calm and serenity. This too is a method that can be used in graphic photographs but often, to create drama, the opposite approach is employed, and a deliberate imbalance is used to create disquiet and to invite reaction. For example, a small delicate object such as a leaf with its complicated form and shape will have these qualities emphasized all the more by being placed against, and surrounded by a background with completely different

Richard Haughton

Tree [illegible] **Study in blue** [illegible] *effective photographs*



Five birds *Telephoto lenses are ideal for isolating details and composing them into graphic images — underexposure gives a strong silhouette effect.* **Landscape** *Similar techniques can be applied to landscapes, using a telephoto to pick out the patterns in a group of fields.* **Paintwork** *Brightly coloured metalwork is ideal for graphic work—it can be effective to tilt the camera*



Ian McKinnell

Light between the cracks *A subject like this is highly suited to graphic images but the success of this shot comes from a carefully chosen viewpoint*

striking way possible

what he or she

on just one area may be

and make a stronger picture

hands or the face, or moving in

still, perhaps just the nails—the

smooth, perfect nails of a

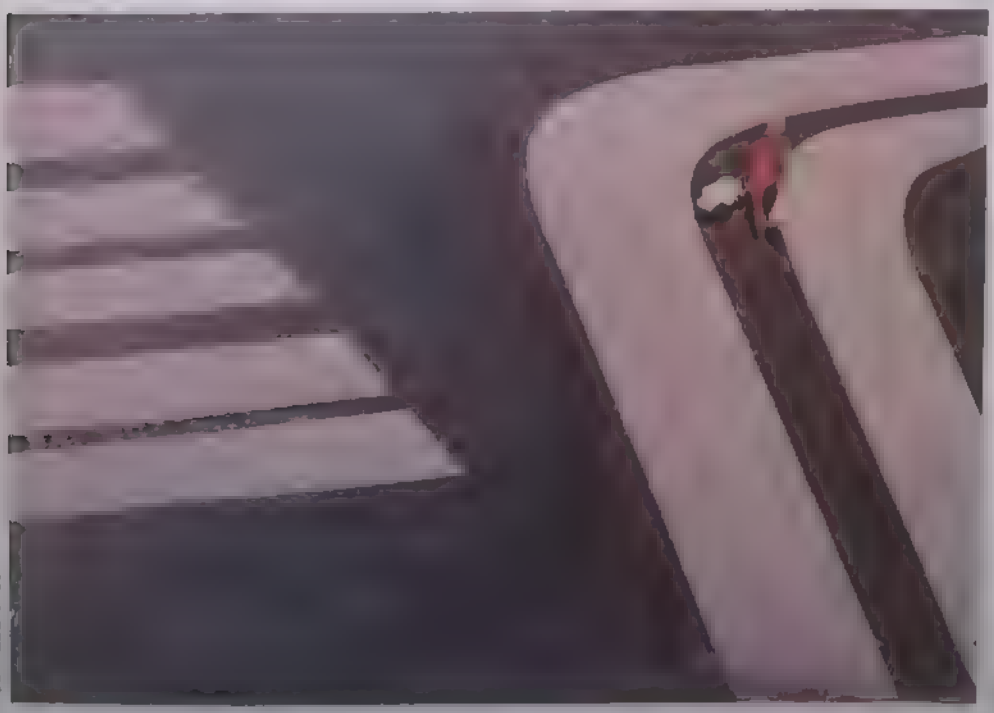
dirty, chipped nails of a mechanic Often

find images are those

rything, but those

tain amount is left to the

viewer's imagination



Robin Laurence

Road markings *You can exploit a high viewpoint to create graphic compositions of the world below—again a telephoto allows selective framing*

What went wrong?

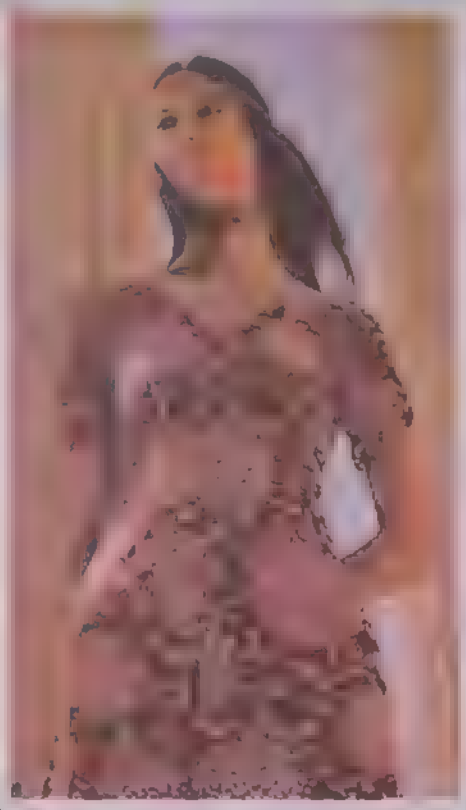
Unusual views

In trying to take a creative photograph, many people resort to unusual viewpoints. But they do not always work out, as Homer Sykes shows in his criticism of some amateur photographs

The unusual angle that this photograph has been taken from makes the swimming pool and balconies almost completely unrecognizable. The bizarre angle and lack of thought about the design of the picture, coupled with incorrect exposure, renders the picture very odd indeed.

Judging from the geometric design of the swimming pool and the circular balconies, one would have thought that the photographer could have produced interesting shots without much difficulty.

When photographing buildings like this the best start is to walk around them. Familiarize yourself with the various aspects of the design. Look for good interesting vantage points that show the building off well. Wide angle lenses can be used very effectively.



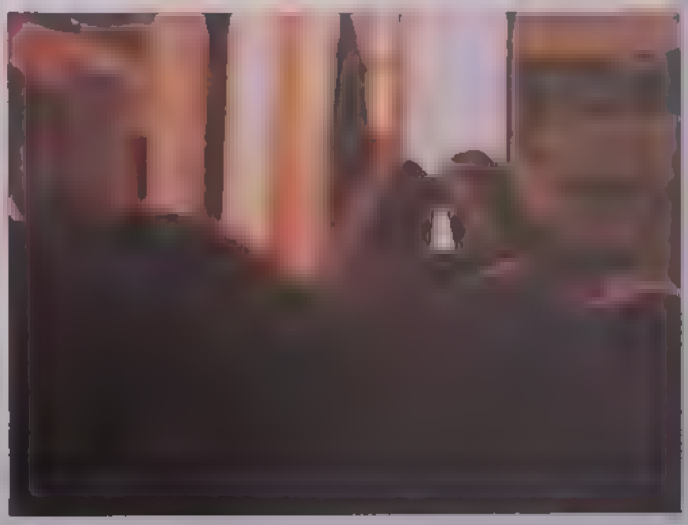
A very boring photograph that looks like a bad attempt at a 1960s fashion [illegible]. The picture could have been improved had an attempt been made to use the columns in a more interesting way. Cutting the picture halfway down the girl's thighs and posing her with both hands behind her back looks awful.

It would have been better to try this shot with a much wider angle lens, perhaps a 28 mm, but from a greater distance to avoid any distortion. Have the girl walking towards you and shoot lots of frames from a low angle, making sure that the building in the background looks good as well.

Of the four pictures on this page, to my mind the unusual angle here has worked extremely well. What a good way to take a family shot.

Unfortunately, the framing is a little on the tight side. It is a shame that the front of the toy car and the woman's legs have been framed out. Presumably the picture has been taken from an upstairs window or from over a wall. A wider angle or zoom lens would have been ideal in this situation. Extra height could have been gained by simply standing on a chair.

The woman to the left of the picture could have been looking up a little if more time had been taken in posing this photograph. This is a good example of a shot which would have been fine, if only.



This nude is something of a disaster. It reminds me of a similar photograph by Bill Brandt from his remarkable book *Perspective of Nudes*. In Brandt's photo, the unusual shot worked beautifully, but here it does not. Instead of looking at a subtle romantic photograph of a girl on a bed the photographer has created a dark and depressing picture that I suspect is the very opposite of what he felt.

The picture could have been better if the girl had been farther down the bed so as to make use of the window light and if the photographer had moved back a little so as not to cut off her right shoulder and her hair. With a slightly higher angle to show more of her body the whole effect would, I think, have been much improved.

Hall

Creative approach

CREATIVE CLOSE-UPS

By turning your camera on the fine details that make up our surroundings you can produce creative images of interesting subjects that might otherwise go unnoticed

Ed Buziak

Chrome grille *Careful choice of viewpoint and use of an ultra wide angle lens created a striking close-up shot of the bright paintwork and the sparkling chrome grille of this commercial vehicle*

[illegible] all the time [illegible] them will not [illegible]

[illegible] this way [illegible] occurred

[illegible] photographer is often [illegible] part [illegible] creating But [illegible] use of close up photography [illegible] even greater demands on the [illegible] tographer's skill and perception Close up work is an art form peculiar to photography there is comparatively little conventional art that concentrates solely on details in the same way The way the lens and film view the world is different in many ways from the way the eye sees it For example, the shallow depth of field that is inevitable in much close-up work can produce images which can never be seen by eye as such This means that the close up photographer must learn to see the world in the same way as the lens and film, in order to spot pictures which would

Stephen J Krasemann/DAK Photo

Madrone bark *The texture of tree bark is a particularly good subject for close-up work.* **Bottle** *Here an everyday subject has been used to create an unusual but intriguing study in shape and colour—its true identity is irrelevant*

otherwise be missed

Imagine a pebble lying in the middle of a road, on a tarred surface From eye level it appears totally mundane and even from road level it is little better But look through the viewfinder of a camera fitted with a standard or telephoto lens and extension tubes, so that it fills much of the field of view, and the pebble is transformed The shallow depth of field renders the background as a complete blur, and in fact the only sharp features are the pebble itself and a thin strip of road surface parallel to the film The pebble appears to be a rock sitting in a rough bla [illegible] take on [illegible]

objects, and cannot recogni[illegible] even parts of a telephone or bathtap w[illegible]thout seeing the overall context

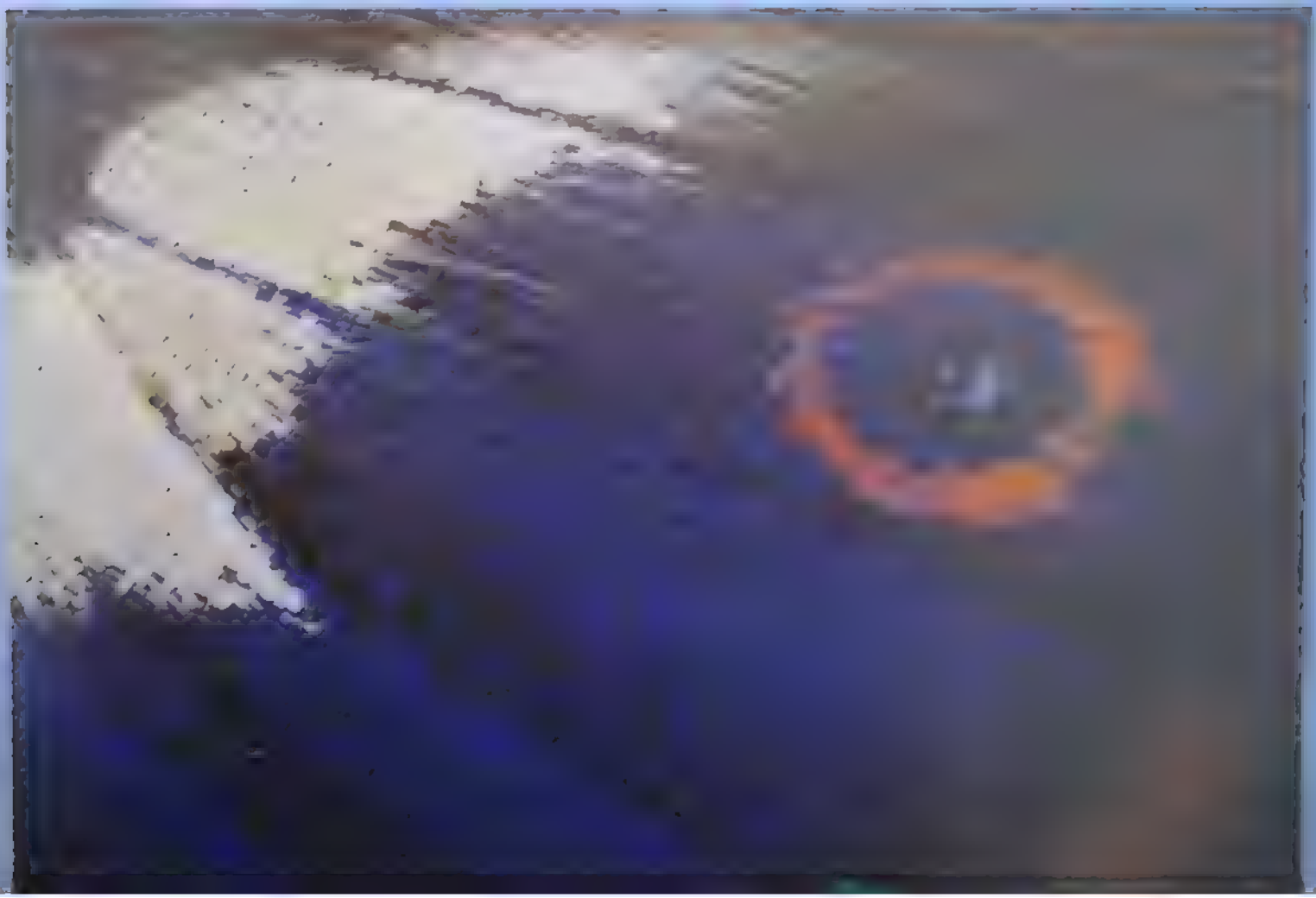
Seeing such photographs in the world around us is a considerable challenge, and needs considerable practice One way to start is to take a less extreme view, and explore everyday objects for interesting details A car or motorcycle, is a case in point—particularly when brand new The details of such features as the tread on the tyres, the moulding of the headlamps and the gleaming grilles are all worth looking at The important thing to decide in each case is what makes a feature attractive Only then can you move close in to emphasize [illegible] feature H[illegible] [illegible] is [illegible]

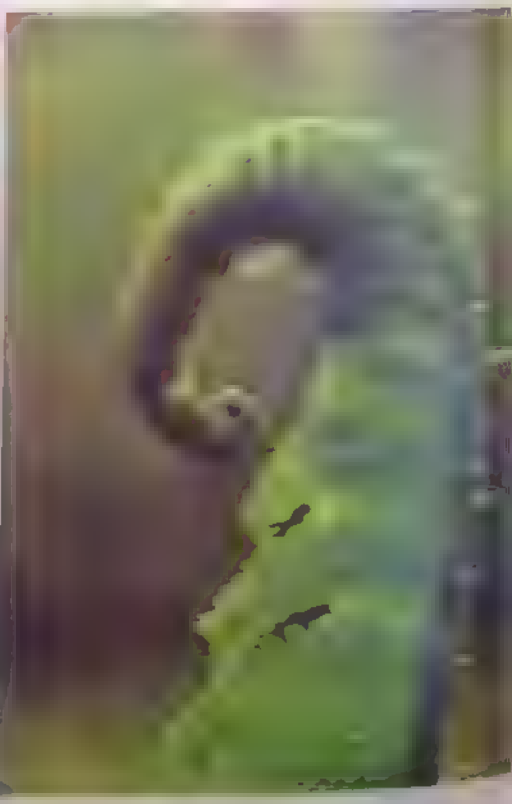
out of its normal context If in [illegible] you make it just a little [illegible] viewer to decide what the objec[illegible] the first place, you have introduced an element of trickery into the picture and this may hold attention further

At such close range, texture and pattern become very important—you might, for example, look at the weave of a piece of cloth or the bloom on an ap[illegible] These are all features which [illegible] around us, and which we probably appreciate without knowing it The photograph selects them and in the ca[illegible] of extreme close ups makes them easier to see. A huge variety of subjects can be treated in this way, from the stones moss or brickwork in a wall to the folds of skin on a tiny baby s hand

You need not even be very close for this sort of work You can use a 400 mm or longer lens, with extension tubes or bellows if necessary, and pick out details of [illegible]

Red mayor [illegible]
[illegible] Butterfly may [illegible]





Iron hinge *Special equipment is not always necessary—close-up photography is equally dependent on an eye for detail* **Boiler door** *The combination of the rusty ironwork and the pleasing antique design is best appreciated without the distracting surroundings* **Pebbles** *Sometimes subject matter may lie at your very feet, but do not be afraid to rearrange small details to make a better photograph.* **Fern** *Composition is as important with a close-up as with a broad landscape.* **Fishing nets** *A short telephoto or a zoom lens can be ideal for moving in and isolating attractive details and textures*

John Sims

object in its context This can give a 'worm's eye' view to objects which again, is impossible to perceive by eye alone since the eye just cannot focus that close

In the natural world this technique allows you to show the countryside as a small animal would view it, or to turn the tiny stems of moss into a forest of tree trunks on a range of hills You can explore totally new dimensions of the familiar objects around you in this way [illegible] way of relating these close-up details to their natural ha[illegible]

focus on [illegible]
while keeping [illegible]

With large format [illegible]
possible to obtain grea[illegible]
the lenses can be stopped do[illegible]
further than 35 mm lenses without [illegible]
definition due to diffraction Such images [illegible]
can appear stunning simply because [illegible]
again, the eye is incapable of seeing [illegible]
close-up objects with great depth of [illegible] in front of you You must [illegible] technical e[illegible] lop an eye for details that anyone els might miss and also [illegible] just how the lens and film will behave

The carbro process

Monochrome and trichrome carbro are forms of an interesting transfer process which results in pigment prints of a fine, almost three-dimensional, quality

The *carbr* [illegible] considerable c[illegible] be made

The carbro process is a transfer process by which the metallic silver image of a fully finished black and white print [illegible] A [illegible] the process greatly enhances the appearance and quality of the image. These characteristics are much prized in top-level portrait work. But the process is now mainly used to produce colour prints by successive printing of three separate pigment images in the colours yellow, red, magenta and blue, cyan. It is used in preference to conventional colour printing where image permanence and quality are important.

Monochrome carbro

A single colour carbro print begins life as a bromide print made on paper which does not have any abrasion super coating. You can try ordinary fibre based or RC bromide paper but the super coating of these may cause loss of [illegible] paper [illegible] descriptors [illegible]

Make a print [illegible] negative reversed on its carrier as the image is reversed during the transfer process. A [illegible] image [illegible] print image [illegible] by [illegible]

Next prepare the special *pigment paper* which consists of pigmented soluble gelatin coated on a paper base. This is available in black and in several colours (for supplies see 'inside front cover').

Cut a sheet of this slightly larger than the bromide print you have made. The pigment paper is then sensitized. Do this by soaking the paper for up to ten minutes in a dish of cool water followed by a single or two bath sensitizing solution such as listed here (see panel). Use solutions at room temperature. The pigment paper is slightly light sensitive after this treatment and while you can work in normal room lighting avoid very [illegible]

[illegible] paper [illegible] place [illegible] better [illegible] bring [illegible] and the exposure [illegible] Then sandwich [illegible] of paper [illegible] sheet of glass using [illegible] between [illegible] the wrong [illegible]

The pigment image [illegible] to any good quality [illegible] paper—even on to a sheet of [illegible] fact any plastic which has suitable surface characteristics. If paper [illegible] used soak this for at least [illegible] cool water before [illegible]

Now carefully separate the bromide and pigment papers—you will [illegible] that the print image has bleached. The reaction which has taken place is a complex one which makes the pigmented gelatin insoluble in direct proportion to the density of the image. Thus in dark areas, the gelatin of the pigment paper is hardened to a greater depth than in light parts of the image. The soluble gelatin is removed [illegible]

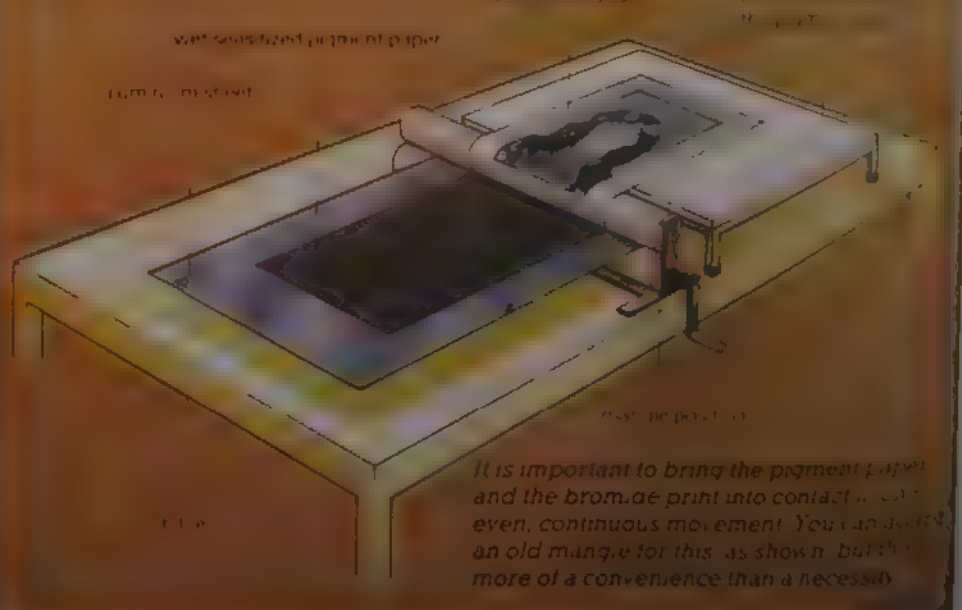
Sensitizing bath formulae

Solutions	A	B	C
Water	900 ml	750 ml	15 ml
Potassium ferricyanide	16 g	50 g	
Potassium dichromate	12 g	50 g	
Potassium bromide	8 g	50 g	–
Succinic acid	2.4 g	–	–
Potassium alum	1 g	–	–
Acetic acid (glacial)	–	–	10 ml
Hydrochloric acid	–	–	10 ml
Formalin (40%)	–	–	220 ml
Add water to make			

Single bath formula *This uses solution A at stock strength and at between 8 and 14 C. Immersion time is between 2 and 3 minutes*

Two-bath formula *This uses separate stock solutions B and C. A is diluted 1 + 3 with water, and paper is immersed for 3 minutes in this before being passed for 15-35 seconds through solution C, diluted 1 + 32—but establish an exact time. This formula is more convenient for large prints*

Using a mangle for printing



It is important to bring the pigment paper and the bromide print into contact [illegible] even, continuous movement. You can [illegible] an old mangle for this as shown but this is more of a convenience than a necessity

or returned [illegible] for later redevelopment—a [illegible] print [illegible] be produced [illegible] original. But quality deteriorates with [illegible]

[illegible] it paper and bring it [illegible] with the transfer [illegible] procedure as [illegible] light pr[illegible]

Prepar[illegible]

Trichrome carbro

Carb[illegible]

p[illegible]

that [illegible]

Sat[illegible]

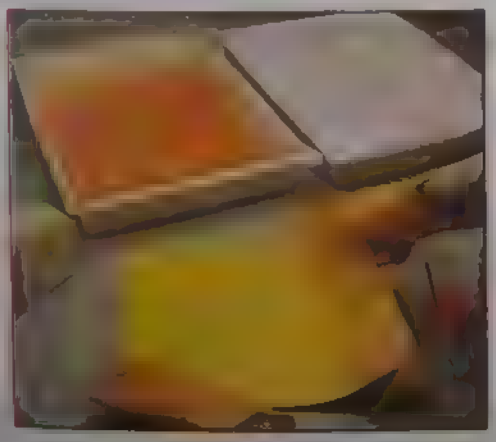
[illegible]

Making a carbro print

1 Although most items of equipment and materials are readily available, special pigment paper must be obtained from the West German manufacturer (see text)

2 Make colour separation negatives by enlarging your transparency on suitable panchromatic film and contact print these on non supercoated bromide paper

3 Wash the bromides thoroughly—use hypo clearing agent if possible—and hang prints to dry in the same manner. The 'blue filter' bromide is densest



4 Cut pigment paper larger than its corresponding bromide. Soak both in cold water for ten minutes (top right) once the sensitizing bath is ready (top left)

5 Use a flat blade squeegee to stretch out the 'red filter' bromide on glass. Wipe outwards in all directions. Then cover the print in a pool of water

6 Remove the pigment paper at the end of sensitizing. Bring the tissue into contact with the bromide. Squeegee and leave 15 minutes, under pressure

Tim Stephens

continued

Image control

The print making stage is probably t

Colour transfer

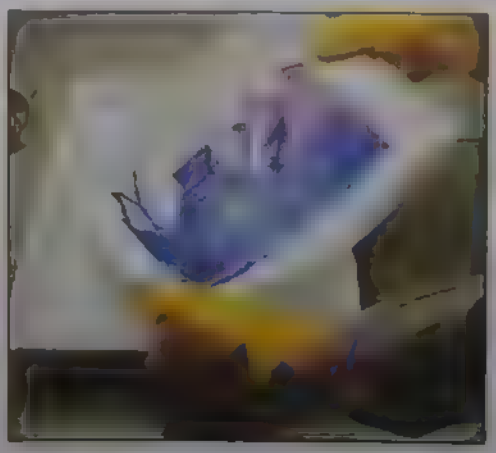
7 Prepare the plastic foil or sheet used for transfer and place this in a dish of water Place the print-tissue sandwich in this and remove the bromide carefully

8 Next place the tissue face to face with the 'keyed' surface of the plastic, under water Removed both together and squeegee the sandwich on glass

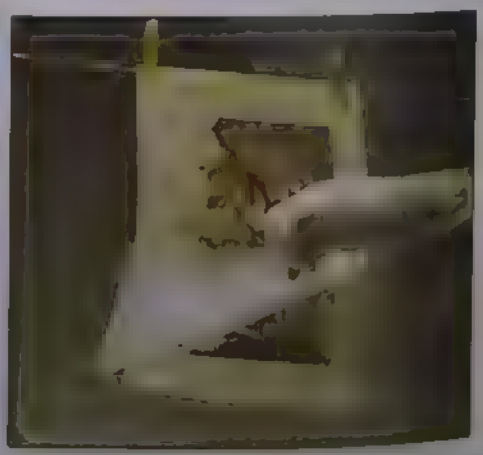
9 Leave the plastic tissue sandwich to bond, under pressure, for 25 minutes 'Develop the sandwich in warm water pigment then adheres to the plastic

Tim Stephens

11 Soak the temporary support paper in cool water Then soak and bring into contact the blue image sheet Withdraw the two and squeegee firmly Leave to dry



12 Again soak the now blue printed support paper, soak the red image sheet and slide this into image register Withdraw the paper and sheet, squeegee and leave to dry



13 Repeat the sequence using the yellow image sheet When dry the plastic sheet simply springs away You now have a three-colour, reversed image

may need a once only k[illegible] transferred gelatin. Use metal polish [illegible] scour the sheet then deter[illegible] remove this. Finally, rinse off all traces of detergent.

Carefully peel off the bromide half of each print-tissue sandwich, a[illegible] resoak the pigment sheet in a dish [illegible] clea[illegible] cool water [illegible] [illegible]own plasti[illegible] [illegible] under light p[illegible]

After [illegible] ten [illegible] pigment [illegible] [illegible] rem[illegible]ve the paper [illegible] the plastic [illegible] do this carefully. After a[illegible] the surplus pigmented gelatin has been washed away, quench the image by p[illegible] the plastic sheet into a dish of cold water. Then set it aside to dry. Repeat the operation for the other two colours.

Next cut an oversize sheet of specially prepared paper known as the soluble *temporary support*. You can make this yourself by coating smooth paper in the gelatin solution. Soak this in water at room temperature to swell the [illegible] coating. Place [illegible] sheet of clean glass and use a hard squeegee to smooth the paper [illegible] directions. Work from the [illegible]wards. Return the sheet [illegible] water.

By now the pigment [illegible] should have dried [illegible] sheets. Take the [illegible] Take the sheet [illegible] paper [illegible] the oven [illegible] bubbles [illegible] sheets [illegible] ther. Squeegee [illegible] together [illegible] When it is dry [illegible] away easily, taking [illegible] made now [illegible]

Now place the made[illegible] face up in the dish [illegible] support paper [illegible] down on this. After several [illegible] withdraw the two [illegible] plastic sheet to register the [illegible] image with the cyan. Y[illegible] sandwich [illegible] any [illegible] this a [illegible] Errors [illegible] sheet [illegible] are in [illegible] plastic and paper [illegible] leave the sandwich to dry. [illegible] repeat the sequence for the yellow image.

Now you are ready for the last stages of the process. Cut an oversize sheet of *final support paper*, which is paper coated with insoluble gelatin. Soak it for ten minutes in warm water and bring it into contact with the temporary support bearing the three images, in a tray of water at room temperature. Withdraw the two together, squeegee the sandwich and put it aside between blotters and under pressure to dry. When this is almost dry prepare a bath of hot water between 40°C and 50°C and immerse the sandwich in the. After about half a minute [illegible] the temporary support [illegible] the sandwich for a little longer and then [illegible]

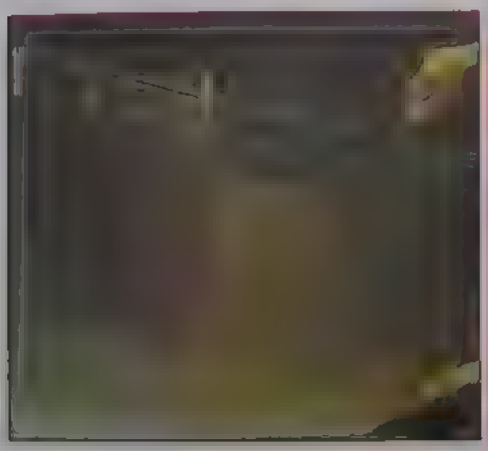
Trichrome carbro *Careful manipulation of either the original separations, the bromides, or pigment sensitization can give colour reproduction of outstanding quality—but real care must be taken over image registration for good results*

[illegible]

Special techniques

A suggested a[illegible] [illegible] [illegible] h the orig[illegible] separation [illegible]urs and tone area [illegible] be modifie[illegible] touchi[illegible] and [illegible] before printing the bromides.

M[illegible] [illegible] These [illegible] the final support [illegible] nique [illegible] images to be mont[illegible] accurately cut out [illegible] box—immediately prior to final tran[illegible] Each image has to be placed on the support when wet and then squee[illegible] leave a safety margin around [illegible] total loss in the final rinse.



10 *Complete, in turn, the blue (cyan), red (magenta) and yellow transfer sheets and allow these to dry naturally and without heat. Hang them all in the same way*

14 *Soak final and temporary supports together in cool water, emulsions facing. Remove and squeegee both together, let them bond, then 'develop' in hot water*

Understanding...

Video recorders

Video is the recording medium of the future, and many amateurs will have to get used to the complexities of video heads and helical scans, rather than the more familiar shutter speeds and film gates of movie cameras

Unlike a conventional movie camera, a video camera does not provide a record of a picture sequence. To store the sequence the signal from the camera must be fed into a Video Tape Recorder (VTR). Although, as the video revolution gathers momentum, VTRs are becoming a familiar sight their workings remain something of a mystery. But to exploit the potential of video to the full, it is important to understand the basic principles.

All tape recorders work in essentially the same way. The recording tape, usually plastic, is coated with powdered magnetic material—most commonly fine grains of iron oxide, each forming tiny magnets. The recording head is a small electromagnet with a tiny gap at the place where it contacts the tape. The head is energized by the electrical signal to be recorded, so the magnetic flow across the head gap varies with the signal. When the tape moves over the head, the magnetic pattern of the grains on the tape is rearranged by the varying magnetic flow across the head gap. The electrical signal is therefore recorded in the new magnetic pattern on the tape. To play the recording back, the tape is simply passed over a playback head which decodes this pattern in a reverse of the recording process.

Unfortunately, while sound can be recorded in this way by running the tape past the recording head, this does not work for video, because a video signal is more complex.

Dave King: head courtesy of Thorn EMI Ferguson Ltd

Video drum *At the heart of every video recorder is the drum, usually carrying two recording heads. This spins so that the recording heads move rapidly over the slowly moving tape*

Bandwidth

A video picture is made up by the different electrical signal from each of hundreds of very small image elements. In the UK, Australia and Germany, for instance, (using the PAL system), the electron gun scans across 625 lines, each with 572 elements, to build up

[illegible] × 572 = [illegible]

[illegible] of light

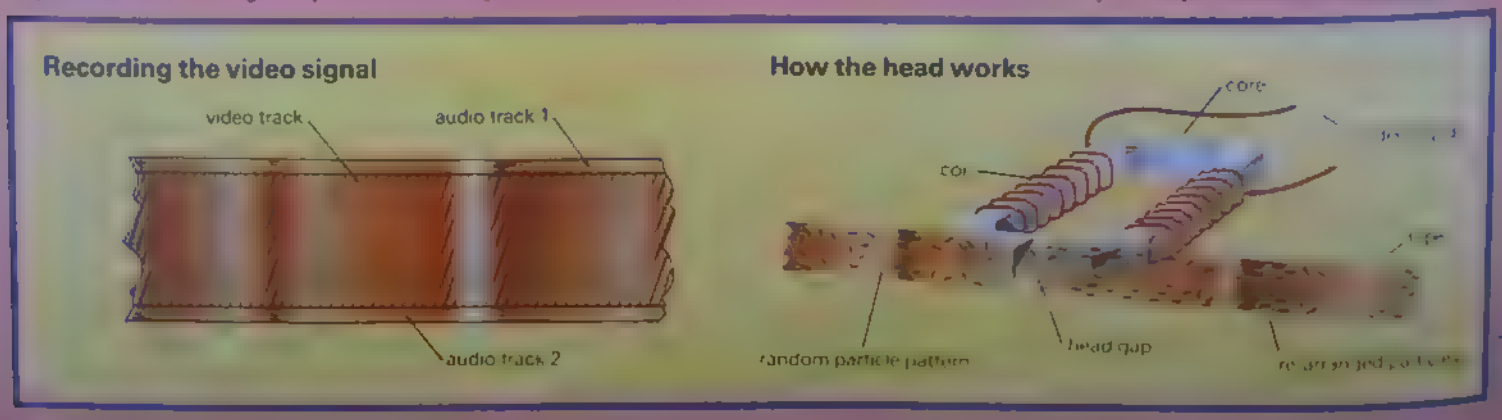
the video tape r[illegible] be able to r[illegible] up to 357,500 × 25—nearly nine million—vibrations a s[illegible] (hertz or Hz). The po[illegible] range of signal fr[illegible] from 25 Hz (with th[illegible] blank) to 9 000,000 [illegible] megaHz), is known as the *bandwidth*.

Theoretically, then, the video tape recorder must be able to record a bandwidth of 25 Hz to 9 MHz. In practice it is very unlikely that any scene will ever give 9,000 000 different signals in a second and an upper limit of 5.5 MHz is usually adequate.

However, a domestic sound tape recorder typically can only cope with a range of 20 Hz to 20 000 Hz (20kHz). So a conventional tape recorder cannot even approach the bandwidth needed for video recordings. The complexity of the

Tape head *As tape passes the head gap, the pattern of particles is arranged in response to the video signal*

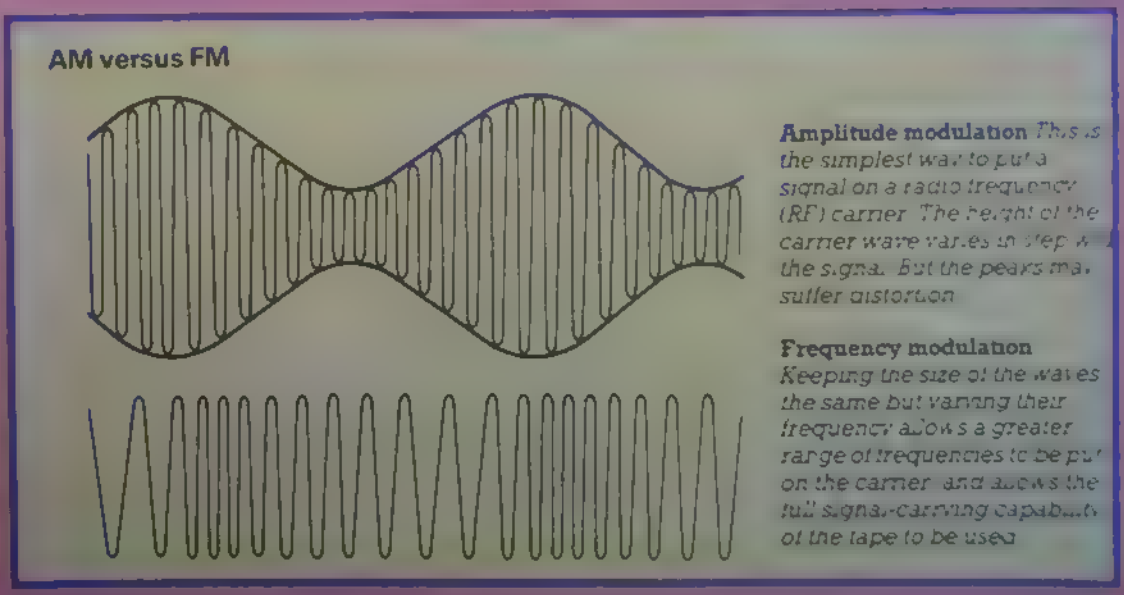
Tape pattern *With helical scan, the video signal is recorded as diagonal stripes across the tape—sound runs lengthways*



High speed tapes

Colour signal

Helical scan [illegible]



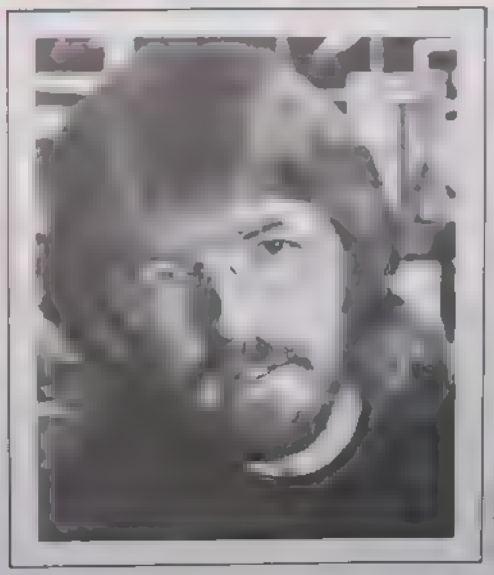
Amplitude modulation *This is the simplest way to put a signal on a radio frequency (RF) carrier. The height of the carrier wave varies in step with the signal. But the peaks may suffer distortion.*

Frequency modulation *Keeping the size of the waves the same but varying their frequency allows a greater range of frequencies to be put on the carrier, and allows the full signal-carrying capability of the tape to be used.*

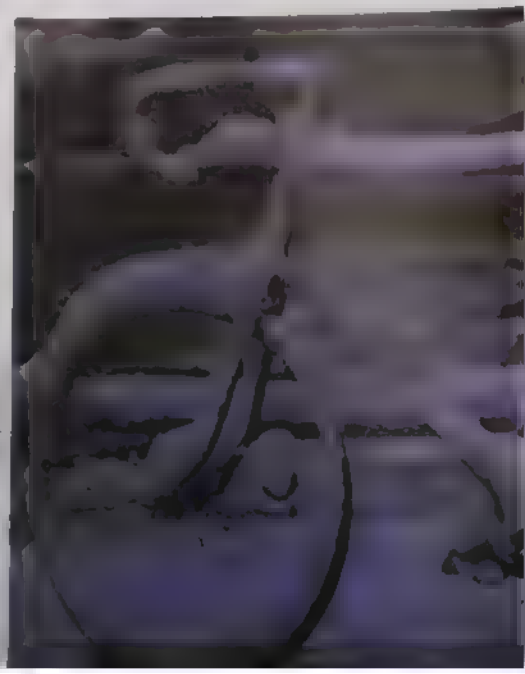
Al Satterwhite

An eye for the strong graphic elements of a subject and a liking for high contrast and striking colours distinguish the work of the successful New York based photographer, Al Satterwhite

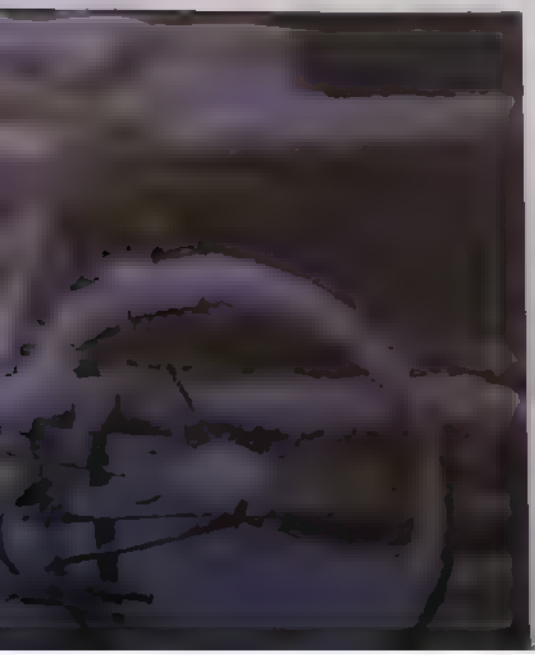
Arizona landscape *Taken just after sunset with a time exposure to catch the car headlights. Satterwhite used an 85 mm lens*



Al Satterwhite *One of the most successful photographers in the competitive world of New York advertising photography*



Snowbound bicycle *A personal picture taken during one of New York's blizzards Hand-held shot, 1/15 sec at f.2*



The White Egret *Taken in Florida using a 500 mm lens, and underexposed by 1-2 stops to make the water look black*

complete break and
where he set up a stu
seriously entrenched in ad

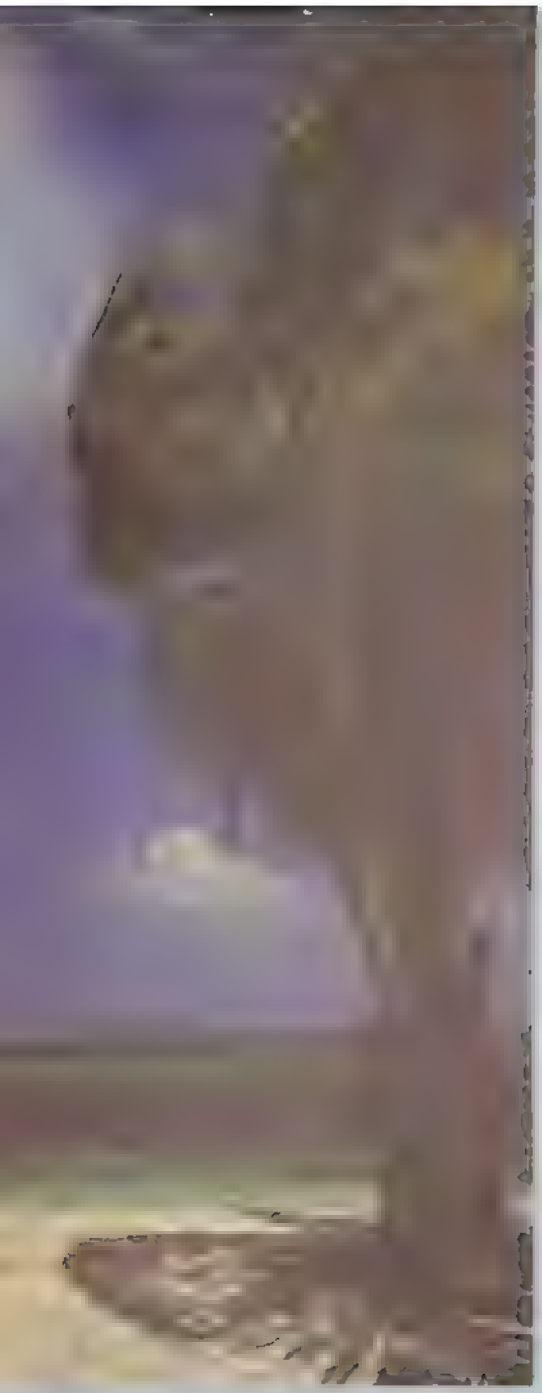
Satterwhite had already start
concentrate on colour photography
while he was a photojournalist and his

Far horizons *On assignment in the Bahamas, Satterwhite used a red umbrella to lift an ordinary beach scene*

Manhattan bridge *Taken from the Brooklyn Bridge using a 300 mm lens and Fujichrome and then recopied on to Kodachrome 25*

[illegible] Back in [illegible] many projects [illegible] to [illegible] to [illegible] agency art directors [illegible] need to do this.

On commercial assignments he will use models when required but frequently prefers to use casual passers by—either placing them in position or waiting for them to walk into a previsualized situation. This makes for more timeless images than a completely prearranged setting which is more likely to look out-of-date sooner. 'I outgrew the timeliness of photoreportage. Now I want my images to be outside of time. That way, they lend themselves to a lot of uses and a lot of different interpretations.



The splash *Shot for 'Sport Magazine' in 1979 at a swimming competition, using 400 ASA Ektachrome at 1/500 to freeze the action*

Los Angeles *This businessman was shot for part of a story for 'Travel and Leisure.' Recopied Kodachrome boosts contrast*

For me that makes a picture last.'

Satterwhite spends 85 per cent of his time in advance preparation—deciding on props, waiting for the right light and arranging the elements of the photograph. 'Actually taking the photograph is a small part of it. When I've finished, pushing the button is almost anticlimactic.'

With his increasingly perfectionist approach, travelling to locations is [illegible] more difficult. [illegible] more assistants [illegible]

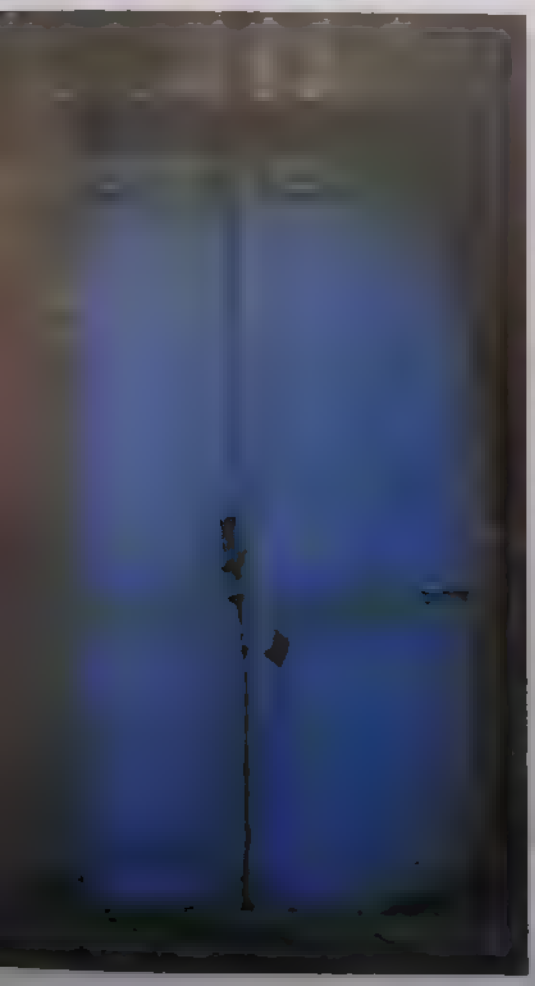
always takes at least two cases containing his Nikon cameras and lenses. One case contains only lenses, filters and meters and the other has cameras fitted with motor drives, regular bodies and Polaroid backs. If I want to take a long lens, like a 200 mm *f*/2, it will be in a separate case. Also we have cases of strobes, a case of hot lights and I usually take two or three tripod cases.

Satterwhite owns everything from a fisheye lens to a 300 mm and generally has the fastest lens possible—most of his lenses are *f*/2. 'I used to have longer lenses, but I don't use them so much anymore. If I want something longer I will either use a teleconverter on the 300 mm to make it 600 mm, or I will [illegible]

Cleaning the pool *Shot at dawn using a 300 mm lens from Satterwhite s hotel balcony and recopied on to Kodachrome*

However most of his personal work is usually done while he is already on assignment. On location he is living and working with his cameras and has more photographic opportunities. In New York too much of his time is already taken up with administration.

[illegible] a studio a good business [illegible] is crucial. 'Even if some photographers don't want to admit it, commercial photography is a business. You have to make a profit and it has all



Gliders *Taken for a slide presentation for Mazda in the late afternoon using a 300 mm lens to compress the shapes*

Mexican doors *Part of an assignment for 'Travel and Leisure' covering several small mountain towns in Mexico*

workshops He helps him to think about his own work He usually photographs instinctively, but when his students ask him how and he has taken a particular picture, it make him retrace his own steps

His classes are usually orientated towards seeing graphically in colour One of the exercises he sets his students is to illustrate how light affects film He gets them to go out in the late afternoon and take pictures of the same subject until dark—at first, at 20 minute intervals

t it published

work

established

this further challenge to his photographic career In the long search to create photographs to satis his own exacting standards, rising to such challenges has always pro ided him with his best stimuli

Camera design

A modern camera is a highly sophisticated piece of engineering. But as it must be made to look and feel right camera design is as much an art as a craft. So, just what goes into it?

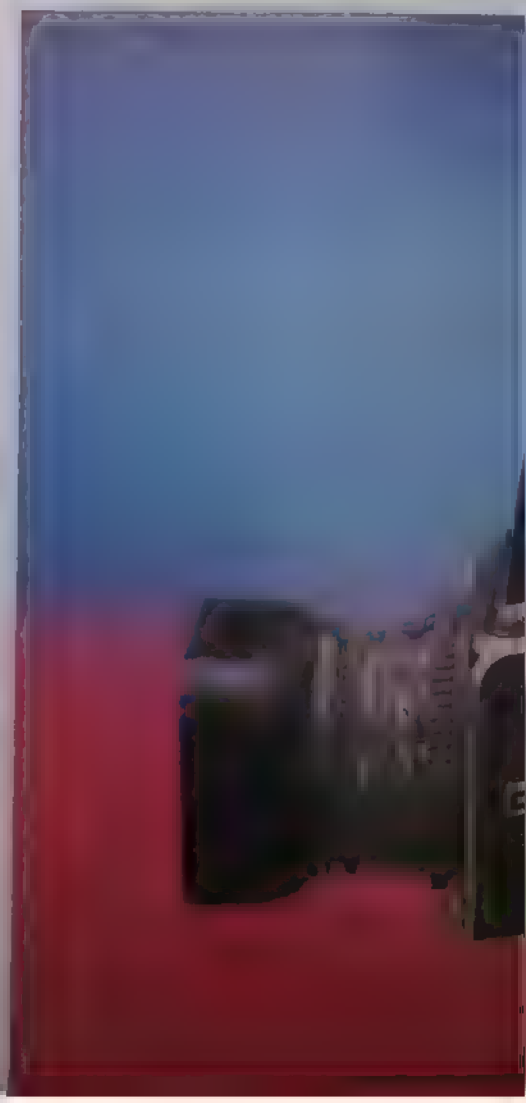
Colin Stafield

Highly prized and highly priced, *the current Leica MP4 is regarded by many as the ultimate 35 mm camera, the perfect combination of usability, traditional craftsmanship and modern technology*

Modern cameras and lenses are highly sophisticated pieces of equipment involving precision engineering of a wide variety of materials. To achieve the high quality photographers have come to expect they must be designed to meet exacting specifications. But for the manufacturer, even the highest quality camera is useless if it does not sell. And camera design involves a careful balance between many factors.

When a new camera is to be designed the manufacturer usually has a good idea of the kind of market it will be aimed at—whether at the cheap 'snapshot' field or the professional. But before the designer can get down to work, the company must get a very clear idea of just what will sell. One way to assess this is to prepare *user profiles*. These indicate what sort of people will buy the camera, what they will use it for and what they are prepared to pay for it. Also, it is surprising that people do not necessarily buy what they ask for. For example, an oft-repeated request is for interchangeable backs on 35 mm cameras but those firms that have introduced them (including Adox, Kodak, Mamiya, and Zeiss) have all dropped them again because of poor sales.

There are also many non-engineering factors a designer needs to bear in mind at the concept stage. Among them is tradition, or customer expectation. A surprisingly important consideration, for instance, is what the customer has come to expect. If a camera is too unconventional, either in appearance or in operation, few people will buy it, as Voigtlander found to their cost in the 1950s. On the other hand, if it is too old-fashioned, it will similarly fail to sell. Once again German manufacturers lost



important in a market where many cameras have similar sp[illegible]

Tradition and ergonomics

Once the marketing deci[illegible] taken, there are three con[illegible] which the camera designer [illegible] tend The first [illegible] camera—the n[illegible] verything into a convenient package with [illegible] operated controls The [illegible] engineering requirement[illegible] a mechanism that work[illegible] keeps on working The third (and o[illegible] overriding) consideration is cost

To a certain extent, an engineer builds on what has been done before Cam[illegible] are almost never designed from scratch Usually, they are built around an existing film format, and employ either existing components or a modification of them This governs much of the design of a new camera, and much of the remaining impetus may come from the need to improve on the old model

Nevertheless, there are origin[illegible] designs every now and then—such as Hasselblad's 1600F of 1948, incorporating only one existing system, 120 roll film. But even then, the concept of the focal plane shutter was not new, and it is widely known that Victor Hasselblad learned much about how *not* to do things from the Primarflex. In 1957, he incorporated another existing component, the Compur shutter, to produce the Hasselblad 500C

Once the Hasselblad had shown the way, other manufacturers produced variations on the same theme The roll film SLRs from Rollei, Bronica and Mamiya each have their own specific advantages, and are fine cameras, but they do not display any marked departure in concept from the original Hasselblad idea

Similarly all modern 35 mm SLRs are recognizably the same as the 1948 Contax S—except for the Rollei SL2000, which is arguably a miniature Hasselblad. But though the basic concept is the same, there have been many detail improvements, from new wind-on levers to the drastic shrinking of the SLR initiated by the Olympus OM-1 to make it lighter, handier, and of wider popular appeal

It is difficult to determine just how much of the design of a modern camera is determined by ergonomics, and how much by tradition The lever wind, for example is almost universally standardized But there are alternatives Those who have tried the baseplate trigger-wind invented by Leitz, for instance, and also used by Canon, believe it is better than lever wind

Others have grown to love (or at least tolerate) alternative lever positions on cameras such as the Alpa, the Retina, the original 35 mm Ektra, the Exakta and many others. Similar examples could be found for the release button, the rewind clutch, the shutter speed dial and just about every other control on the camera

Certainly, some locations and modes of operation are much more convenient than others Most levers, for example are better than most knob winds Sometimes the most unusual designs can, once initial prejudices have been overcome, prove more than satisfactory The Hasselblad, for instance, seems at first very awkward to handle, with all the controls in the wrong places But with a little practice, and the Hasselblad-approved left-handed grip, it is suddenly transformed into one of the best-handling cameras of all time

It is certain that what pleases one person will not necessarily please another, and so there can never be any single 'best' cameras To the designer, this means that there is still plenty of scope for originality for the prospective buyer, it means that you should alwa[illegible] try out any camera before parting with your money

Kodak Ektra *Built in 1941, this was the first attempt at a 35 mm camera with an interchangeable magazine back. Although technically sound, the camera was uneconomical to produce in small numbers*

A modern classic *The current Hasselblad 500CM is still basically the same as the original 500C of 1957. Most modern Hasselblad accessories will still fit even their earliest models*

Adox 300 [illegible]

Inside the Canon AE-1 *[illegible] million the AE-1 is the world's most popular automatic SLR. It is also one of the few to feature shutter priority as opposed to aperture priority*

[illegible] plated brass

[illegible] table when the camera [illegible]

Cost saving by [illegible] more complicated. A [illegible] might be the [illegible] die cast [illegible] cameras [illegible] This is an excellent [illegible] solution because they are still [illegible] and light. They are also [illegible] because they can be made [illegible] cheaply by machine instead requiring long hours of expensive labour intensive work by skilled [illegible]

Perhaps the most [illegible] example of cost-saving design is the [illegible] use of electronic shutters. An electronic shutter is more accurate than the mechanical types of [illegible] and can be made [illegible] the camera metering system. Moreover [illegible] the shutter can be mass produced at low cost and [illegible] the camera as a [illegible] The only drawbacks are the electro-mechanical interfaces which require extreme care and [illegible]

Design and engineering

Cameras are [illegible] to be manufactured [illegible] as Fuji [illegible] the precise [illegible] film [illegible] should not [illegible] tolerances [illegible]

Similarly, the [illegible] across the frame depend [illegible] width [illegible] as [illegible] exposure. The [illegible] that it compensates [illegible] of the [illegible] plane [illegible] gradually [illegible]

A less apparent problem arises from the [illegible] characteristics [illegible] pupil at the [illegible] the light falling on the film [illegible] if the aperture stays the same. A TTL meter, if fitted, must be able to handle this as well as the effects of interchangeable screens.

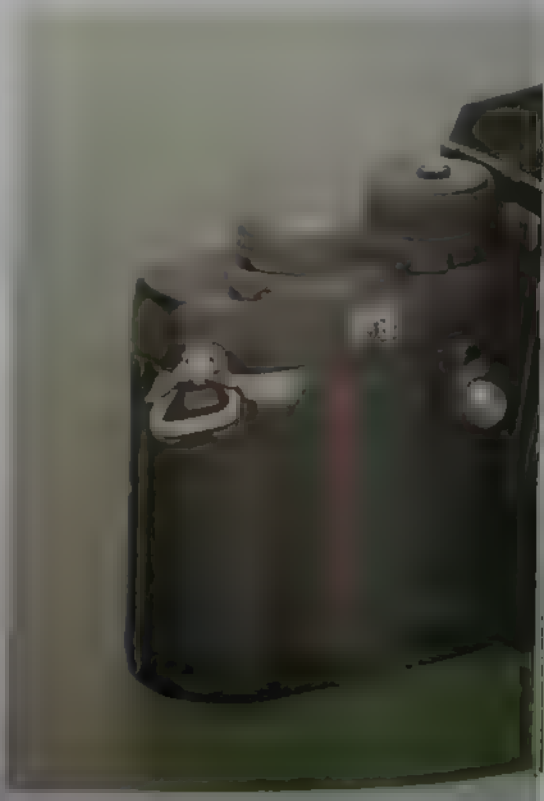
It is important to remember that it is not enough to simply achieve these tolerances once. They must be repeatable, millions of times—indeed for as long as the camera is designed to last and under all kinds of rough handling.

The need for robustness combined with precision is evident in the interchangeable backs of roll film SLRs. They must be able to withstand being changed [illegible] perhaps clumsily and be sufficiently [illegible] that a small amount of dirt does not affect the operation. But there are several linkages between the camera body and the back these are expensive to make and potentially vulnerable. Most importantly it must be light tight.

Even when the back is in place the [illegible] possible entry point for rain and dirt as well as light. Moreover [illegible] pressing may be needed so that the photographer cannot take pictures with the [illegible] in place remove the [illegible] with the [illegible] removed [illegible] exposures.

[illegible] are that [illegible] lenses [illegible] Not surprisingly [illegible] the [illegible] but [illegible] and may be [illegible] camera with apparently impressive specifications than to sell a much better but more basic model.

Essentially, the cost of making a camera can be reduced by any combination of three things: reduced quality, intelligent design and efficient assembly and construction. Quality can be reduced acceptably by specifying less expensive and exotic materials, for instance. One example is the use of gold plated flash contacts instead of solid gold–iridium alloy. Naturally, only the finest cameras would specify the solid



ly and careful protec
orrosion in use and
repair. A repairer can no
b eye as he could on a
and he may have to
ut the dirt
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and attempt to get th
at approach though h

Voigtlander Vitessa, *Known as the bomb doors model, had an unusual wind-on, a giant 'shutter release' on the top and focusing by a thumbwheel on the back plate*

Pure decoration *The red stripe on the Nikon F3 has no practical function at all, but it does help the F3 to stand out from other black SLRs on the camera shop shelves*

anfield/cam. Courtesy of Vintage Camera Ltd

Improve your technique

Putting together a portfolio

If your pictures are good enough, you might want to try to sell them, either directly to clients or through an agency. But first you must make up a well prepared and presented portfolio

All photographs by Dave King

Choosing the pictures

[illegible]

[illegible] and aesthetic virtuosity of your work [illegible] idea is to give some idea [illegible] interested [illegible] certain subje[illegible] which is de[illegible] that [illegible] have experi[illegible] and know h[illegible]

[illegible] there are any [illegible] must not be [illegible] camera shake [illegible] there can be [illegible] example in a [illegible] might not be [illegible] the right amount [illegible] each picture and see if [illegible] simple way in which the shot could have been improved If there is, leave it out

It is best to edit down to the very best shots and try to group the pictures around various themes or subjects A general folio, for example, could have sections on portraits, still [illegible] landscapes, and so on An editorial folio could have sections on demonstrations travel shots (grouped by country) candid street shots and special events (grouped separately) The types of division you use are up to you, and should be designed to suit the nature of your work But make sure the groupings are logical and obvious so that the viewer can understand them without being told

If you have had any work published include it in the folio, but only if it is good Poor published pictures next to good personal shots suggest that you cannot work to an assignment Any substandard work is also boring to look at

Suitcase folio *This sturdy type of folio will carry a large number of prints and transparencies. It is worth including some business cards to leave with the agency*

Fashion photographer Sandra Lousada *To show that she can handle different types of fashion assignments, Sandra Lousada's portfolio shows a variety of fashion styles and a variety of photographic problems: hard theatrical lighting for a leather jump-suit, more delicate lighting and a romantic setting for a softer fashion style, plus the technically difficult shot of a face in a mirror. The changes in scale of the photographs from close-up to full figure add further variety and interest to the portfolio*

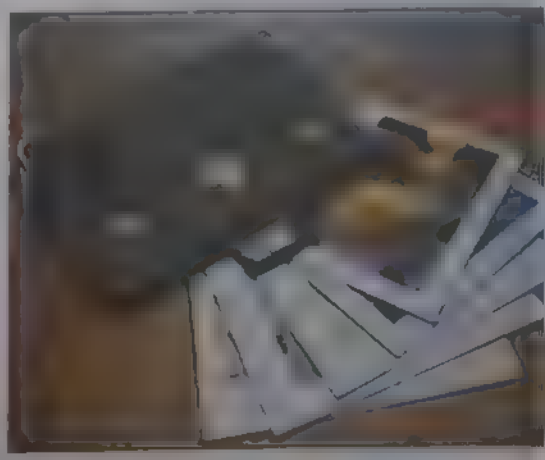
[illegible]

Presentation

[illegible] pictures to a maga[illegible] example, then they will most likely want to see original colour transparencies or black and white prints which they can keep for a while But for showing to friend[illegible] and as a way of introducing your work (and yourself) to people [illegible] mounted prints in colour and black and white are more appropriate

This usually means making prints [illegible] the most important transparencies Large prints (36 × 28 cm, for example) are most effective if the technical quality of the work is good enough to stand this degree of enlargement Bigger prints however, should be avoided as they are difficult to look at when held at relatively close distances Print quality is very important, so it is worth spending time or money on getting top quality prints made—quality is far more important than [illegible] print mounted [illegible] is limits the flexibility [illegible]

[illegible] ted presentation and [illegible]



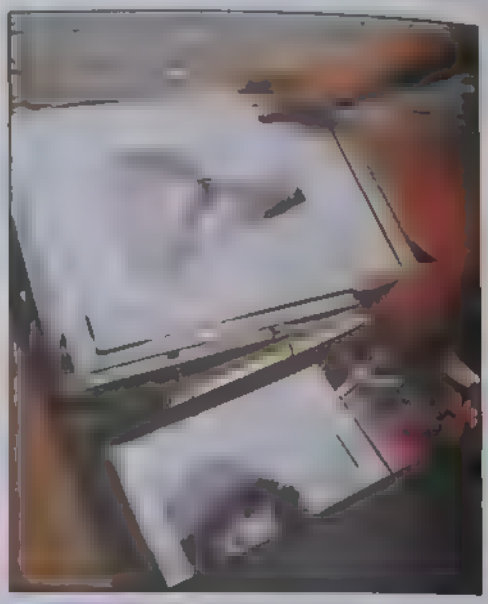
Trimmed and laminated *These prints, all made to the same size and carried in a smart case, make an effective presentation. Lamination protects the print surface*

Portfolio by Julian Nieman/Susan Griggs Agency

Advertising and industrial work *Julian Nieman's portfolio prominently features work commissioned by Kodak Including photographs taken for a presitgious name always makes an impression, but anything carrying a date has a limited portfolio life. Old work should be regularly replaced. Nieman shows his versatility by including a simple but striking still life together with more complicated set-ups. The image on the business card acts as a reminder to a client of the photographer's ability and personal style*

Portfolio by Mike Abrahams/Network

Reportage *A press photographer is often pigeon-holed by agencies as only being suitable for one kind of story, so Mike Abrahams of Network has included a wide variety of assignments in his folio. There are 'hard news' shots of headline stories and photographs of prominent politicians, pictures that are in constant demand by newspapers and magazines. But there are documentary pictures too, and though working mainly on location, the shot of the theatrical group shows that he is also at home in the controlled environment of a studio*



Ring binder and plastic sleeves *Folios of this type are a useful alternative to lamination. The case also has a pocket for loose prints and published work*

present their surfaces soon become very scratched and dirty, so it is a good idea to fix a few pieces of [illegible] to the back of each print using glue or double-sided adhesive tape to prevent this happening

Prints can be laminated on their own or after being mounted on to card Mounting on to card is usually better as, by using the same size and colour of card the folio looks far neater and more professional than a collection of prints of various shapes and sizes. It is also a good idea to keep all the mounts the same way up for viewing. For example, you could use rectangular mounts, all of which are horizontal ('landscape' format) when viewed The result is that when people look through your work, they do not have to keep turning prints round

If you find that lamination is too expensive (a single sheet often costs as much as a roll of Kodachrome), there are a few cheaper alternatives. You can, for example, simply dry mount large prints on to thick card. These eventually become dog-eared and dirty, but look impressive in the short term

You can also put prints into plastic sleeves Many of these are designed to be clipped into ring-binder folio cases to make a loose-leaf book It is possible to buy books which contain permanent

Adam Woolfitt *As an editorial photographer specializing in travel, Adam Woolfitt has had his work published in magazines throughout the world, and since for him the work of the photographer is not complete until the picture appears on the printed page he has included a number of sample spreads, cut from the publications and mounted (tear sheets). This not only shows the range of subjects and situations he has photographed, it also shows new clients the way in which previous magazines and their editors have used his work*

bound plastic sleeves These are available in A4 and A3 sizes, and are useful for presenting complete photographic projects, but are not very impressive as folios

Transparencies should be presented in identical mounts too The best type is the black card mount which takes twenty 35 mm, twelve 6 × 6 cm or four 5 × 4 inch transparencies (see page 1405). This type has slots into which the transparencies slide, and has a plastic cover in which the entire mount is placed to keep everything clean

You do not have to fill the whole mount with pictures An array of 20 pictures can be confusing and intimidating to the viewer It is often better to use, say, 12 pictures, and fill the remaining gaps with black card This may mean using one or two extra mounts than strictly necessary

Try putting a variety of transparency [illegible] mount—a mass of 35 mm [illegible] ly shoot [illegible] the best picture [illegible] up to 6 × 9 cm, [illegible]

Arranging and using

For the sake of variety and interest you should include both prints and transparencies of various sizes in the folio But do not be tempted to cram in everything in the hope that your victim will find something of interest

Remember to keep the folio up to date This is particularly important if your work is biased towards reportage—photographs of an event which happened five years ago suggests that you have not been doing much since Old pictures of this sort should only be kept if they are very good, and display your photographic ability as well as news content

It is a good idea to mark prints and [illegible] cies with your name, address [illegible] one number But do this on the [illegible] ing your name time and time again becomes very tedious for the person looking at the work Generally the presentation should be as neat and simple as possible If you have separate mounted or laminated prints and sheets of transparencies, keep them together in a portfolio case

The best type of case is like an overgrown briefcase, which is strong and easy to use But these are expensive and there are many alternatives The types to avoid are the folders made of card which use tied laces of ribbons to hold them together The laces inevitably become solidly knotted at the wrong moment, and the folders soon look tatty Whatever case you use, it should always look clean and smart—careful presentation implies pride and care in your work

Assignment

San Francisco

Through the lenses of photographer Sergio Dorantes, San Francisco shows itself to be one of the most pleasant cities of the United States. But the approach to this assignment could be taken almost anywhere

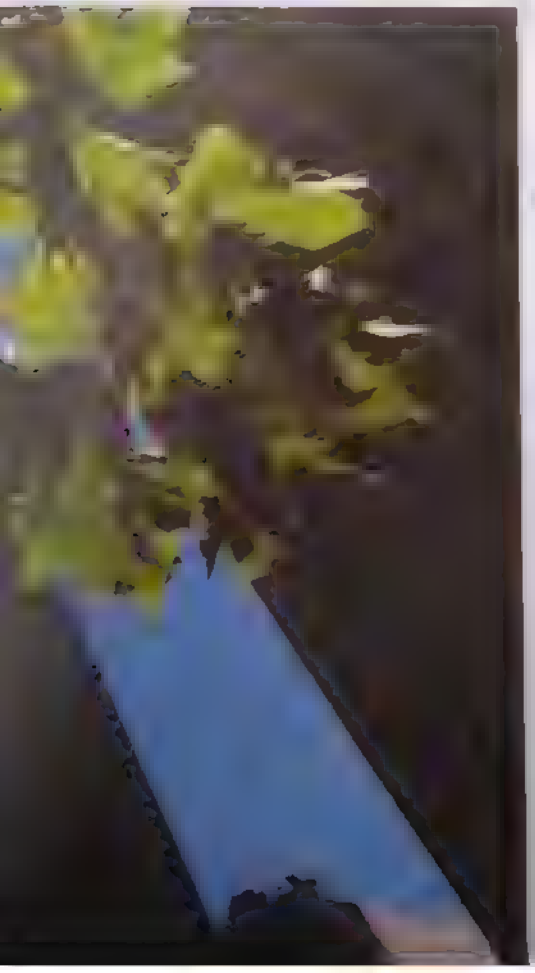
to de

to photograph and roughly whe

do it. Sergio devised a plan that enabled him to cover the various locations during the best hours of daylight—early morning and late afternoon. An organized shooting schedule also allowed him to make best use of his limited stay in the San Francisco area

Row of houses [illegible] Uphill tracks [illegible]

Looking up [illegible] **Golden Gate Bridge** [illegible]



Zigzag road [illegible]

Coloured houses [illegible] these [illegible] to organize them [illegible] a straight pattern

Distant view To get a good long shot which included most of the city centre Sergio waited until early evening when the warm light struck the buildings and the artificial lights showed up well.

What went wrong?

Textures

Photographers are often attracted by the textures found in everyday life. Such pictures involve aesthetic as well as technical problems—Colin Molyneux gives his comments on four 'texture' shots

These antique books make a very good study in texture, but there are two points which would have helped [illegible] First, it would have been better if the photographer had filled the frame completely with the subject and not left the black space on the left which tends to unbalance the composition. Second, the [illegible] directional light has created bright highlights and harsh [illegible] which have in fact detracted from the texture and tooling of the leather. To bring out the surface texture of a subject the light needs to be directional, but it is often more effective if softened by tracing paper or bounced off a reflector. This reduces the contrast and allows the subtleties of the texture to show more clearly

stand out even [illegible] Moving in a little closer just enough to exclude the light green stem at the top right of the frame would remove a distracting element. It's worth remembering to check all the edges of the frame before pressing the shutter

I can see what attracted the photographer to this subject but I don't think he or she spent enough time thinking about it before taking the picture. The surroundings contribute little, if anything, to the shot and as the detail in the wood is the most interesting aspect of this subject it would have been much better to have moved the piece of bark to a more neutral background and to have moved in closer making sure that no part of the subject ran out of the frame. This would have concentrated attention on the patterns in the wood. A directional but softer light source, softening the shadows and making them less obtrusive, would have improved this picture considerably, bringing out the texture better

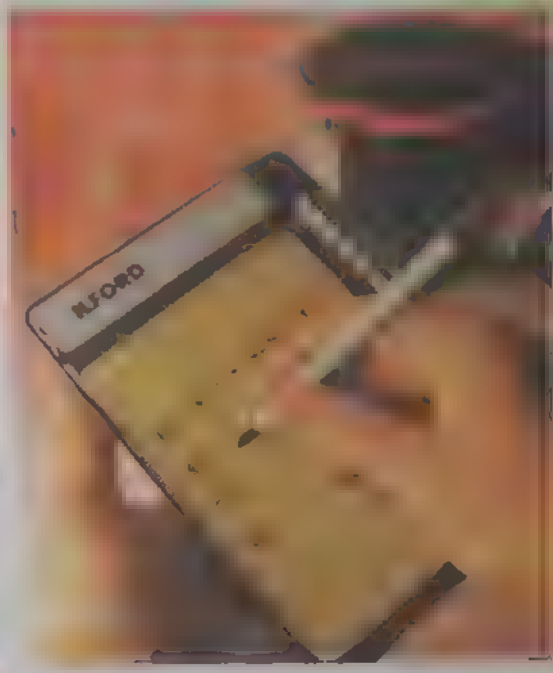
I like the contrast in colour and texture between the feather and the background of leaves in this picture, but I think a closer viewpoint would have helped give a little more emphasis to the feather. As it is, the composition would have benefited from moving the feather more off centre, thus giving the eye a chance to wander over the leaves. At present the eye is drawn straight to the centre of the frame and isn't encouraged to take in the textures.

There is a technical problem as well—not everything is sharp. With pictures like this depth of field is crucial. I would have used a more square on angle, thus making sure that whatever the *f*-stop used the picture would be sharp from top to bottom of the frame. It's the detail which is important in this type of photograph, and it needs to be sharp all over the frame to be effective

Darkroom aids

Low cost and easily made labour-saving devices deserve a place in your darkroom. Although you have to consider the choice of more expensive items more carefully, these too can prove extremely useful

Printing accessories



Luminous notepad *An extremely useful low cost accessory for making notes in safelighting or in darkness—ideal for filtration notes in colour printing*

Find that switch *These little luminous stickers can be stuck on or near switches, printing aids and darkroom accessories to help you find them in darkness*

[illegible] from [illegible] in shown [illegible] of printing paper

Dark bord[illegible] stricted in s[illegible] the very edge of the prin[illegible] look particularly attr[illegible] normally produced by g[illegible] second exposure, this tim[illegible] smaller than the main image [illegible] be accurately positioned [illegible] mask blades to ensure that the e[illegible] border is even. This mask can be cut from card or, better still, from more durable plastic, in several commonly used print formats. The blades of the masking easel can be adjusted to give borders of different widths and small spacers such as matchsticks, may help

Fault finder *Pre-exposed quality control strips of film and paper can be bought to test your processing routines very accurately. These can help you to isolate the causes of, for example, a persistent processing cast*

[illegible]

[illegible] test strips in the dark can be [illegible] and tiresome so for efficiency [illegible] can cut test strips by running a knife down the channel

This is much more economical than buying a paper trimmer but if you already have one then you could tape some card on the board a little way back from the blade, and butt the paper to be cut against the card In this way you can produce test strips of consistent size quickly and easily Take care when using the guillotine type of trimmer in the dim lighting of a darkroom

Alternatively, a non slip alloy ruler with rubber underneath could be used with a knife and cutting mat to chop strips for tests But a test strip printer with slats that reduces the number of times you need to cut paper is a better idea

Aids under safelighting

[illegible]

Format books

You can make these print masks to match the print format you use. By varying the type of insert, you can print black borders as well as multiple prints

Digital readout *Not only the height of luxury, but accurate and convenient too—Ilford's digital thermometer which can be obtained in Centigrade and Fahrenheit models. At the other end of the scale are these stick-on crystal thermometers which can be used to monitor solution, tank and waterbath temperatures. They are available from aquarists' suppliers*

[illegible] readings [illegible] total [illegible]

[illegible] may find it he[illegible] safelighting [illegible] provide useful lo[illegible] can be used to inspect and [illegible] negatives for printing The [illegible] LED type is especially suited to th[illegible] application

Substantial improvements to safelighting can be made by replacing conventional styles of safelights by fluorescent lighting units for which special [illegible] fluorescent tubes can be obtained These are fitted in place of normal tubes to give diffuse amber or red lighting

The same type of tube can be fitted to an ordinary lightbox to give you one which can be used—at a safe distance—as a flat safelight on which you can select the negatives to be printed The light from this should be more than sufficient to provide the whole darkroom with safelighting

Temperature control

Dish warmers and process solution tempering baths are useful and often essential—if you do colour work or other processing where accurate high temperatures have to be maintained But for less critical work, the simple waterbath is usually quite adequate, and various [illegible] ploying crystal displays can be stuc[illegible] any container whose temperature [illegible] removed once positioned, but form a [illegible] control which can be stuck to pipework glass and plastic Attached to the side of [illegible] be used to measure the temperature of the waterbath or the temperature of the tank contents

Cutting board

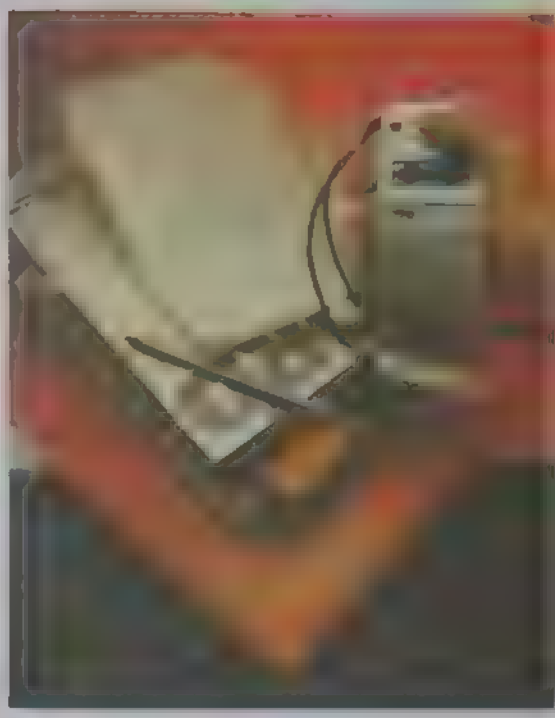
This cutting board can be used to cut test strips or sheets of printing paper to a constant size with safety, even in very low lighting

Variable formats *A quartered piece of card can be used to print four images on a single sheet of paper simply by rotating and flopping it to uncover a fresh segment. Alternatively, you may prefer either the convenient Jobo or Durst variable format masks*

LED better *For bench use, this new type Durst safelight using LEDs (bottom left) is far superior to conventional safelighting. It can be used for both black and white and colour printing at a safe distance*

Calculators [illegible] **Notetaker** [illegible] tape recorder with [illegible]

Note making



Fluorescent safelight *Batten mounted safelight from Encapsulite gives a flood of shadowless light. Unmounted tubes are also available—and can be fitted within an ordinary lightbox to act as both safelight and viewer (far left)*

On the streets

Taking pictures of people on the streets can be difficult and hazardous. But following a few guidelines can help prevent you from ending up with dull pictures or a smashed camera

Approaching the subject

In action *For this shot (left) the photographer used some railings to gain height, so giving a better viewpoint. He can be seen taking the picture in the [illegible]*

Getting the point *Sometimes getting close to the subject is dangerous. A long lens allows you to keep your distance*

you wil
right plac
format

ground, bridges or buildings whic
could provide good vantage points If
any famous people are going to be
present make sure you know what they
look like—perhaps by consulting old
newspapers or magazines at your local
library At this planning stage it is often a

and then plan your
equipment to suit

Some events are d
however Violent d
riots present opportunities to
dramatic and exciting pictures but can
also be quite dangerous Although you
may feel like a neutral observer the
participants may decide otherwise

China talk *A telephoto lens is useful when you want to avoid disturbing an intimate or peaceful scene*

Once again cloth
should dre
identih

If things
sheltered doorway or get your back
against a wall or p ed car It is very
hard to s and watch your

Street girl *The background is an important part of this shot, and was included by using a wide angle lens*

Ski street *You must be familiar with your equipment so that you can respond quickly when you see something unusual, like this*

Homer Sykes

they are sharp

often find th

time for crit

are using wide a

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correct

biect into f

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conditions and subje allow (it is not a good idea to use a s ow speed with fast oving subje

might be necessary to allow a fast shutter speed with such sub

To make rough focusing even eas you could try using one of the focusing aids such as matchsticks or stickers on the lens barrel (see pages 1346 to 1349) Alternatively, you could use the hyper focal distance of your lens for the aperture in use (see pages 962 to 963)

It is essential that you know your equipment very well You should know without looking, which way the focusing ring turns to go towards infinity, which way the aperture ring turns to open up, and which way the shutter speed ring turns to get a slower speed. Using lenses made by the same manufacturer is an advantage here as there tends to be greater consistency in this respect, and also in the layout of the lenses—whether, for example, the aperture ring is in front of or behind the focusing ring

Carrying your equipment also needs some careful forethought Bright shiny cases especially those with the manufacturer's name on them, are very

City couple *Using a wide angle lens and preset focus allows you to grab shots, even without looking through the camera*

reportage photographers prefe 400 ASA (ISO) film such as Tri X as it and enables photographer to ranging from interiors without anging films And in daylight it allows you to use a small stop for large depth of field

Things are slightly different if you want to shoot in colour Fast colour films do not give particularly good quality and as a rule it is best to shoot with the slowest film that suits the conditions If

you to correct any colour d by unusual lighting conditions, it the print stage

If you think you might be abl your pictur or if for any o roduce them ould shoot on transparency colour Transparency film has superior sharpness and colour saturation ative film and so is pre production And remember that if want to sell some pictures of an eve the press, you need to get the pictur processed fast before the shots lose their immediacy, or somebody else does the same before you! This means using films which are capable of being ru processed, such as Ektachrome as opposed to Kodachrome which can take several days No matter how good your shot, if it is yesterday s news it is worthless to the media

John Garrett

Dancing bears *Street entertainers make interesting subjects, but you may have to make a contribution in return for taking the picture if you are to avoid trouble*

Modern Mohican *Odd subjects need to be photographed in suitable settings, so you should always be aware of the backgrounds in your shots Here the dilapidated building is an appropriately wild location*

Understanding...

CCD Cameras

A silicon chip called a CCD—already in use in video cameras—may revolutionize still photography in years to come. Instead of using film or even tape, electronic still cameras use magnetic discs to record pictures

Video CCD *This CCD is being used in a video camera which is smaller and lighter than one using a conventional vidicon tube. Half of the CCD is shielded to store the image during readout*

Coloured images

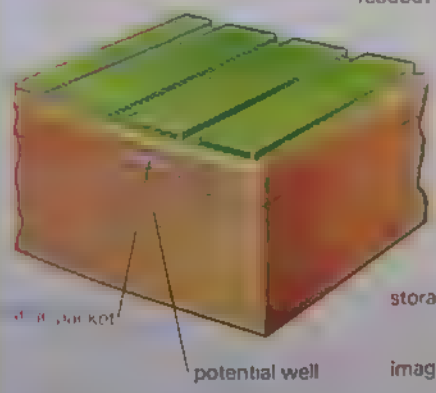
How the image is formed

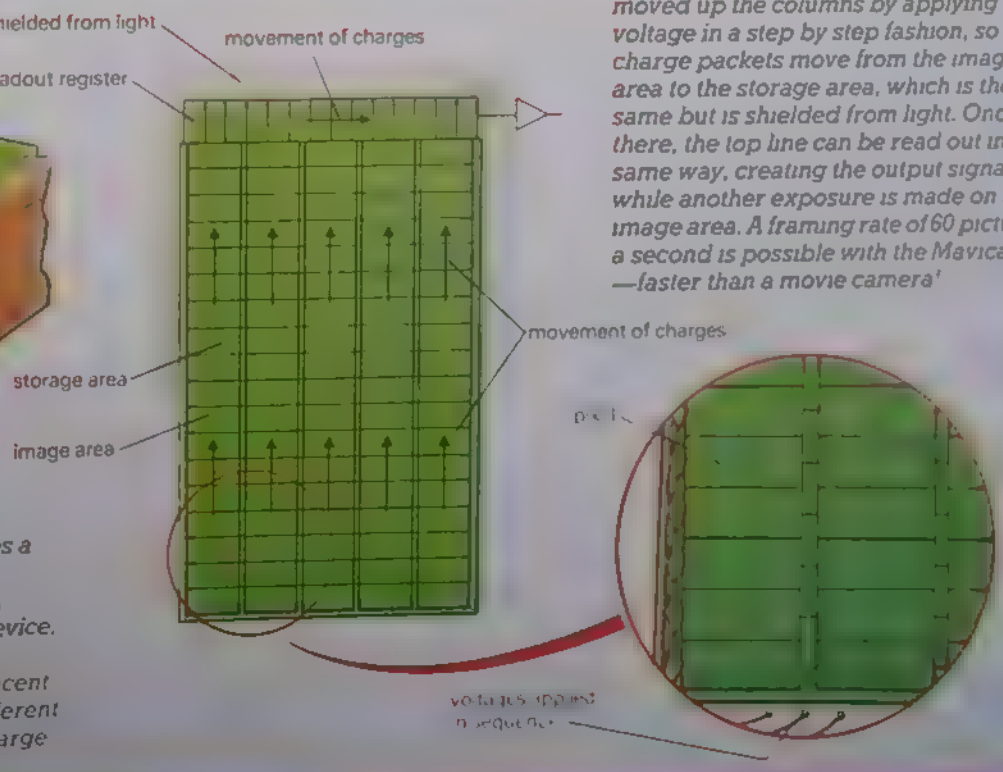
Image quality

Mavica *Sony's prototype CCD SLR features interchangeable lenses and reusable magnetic discs*

Printout *Mavica pictures may be printed on a thermal or printer, or displayed on a monitor or machine. Quality is limited*

How CCDs work





Charge readout *The storage electrodes are connected in threes, each group forming a pixel. The potential well is moved up the columns by applying voltage in a step by step fashion, so the charge packets move from the image area to the storage area, which is the same but is shielded from light. Once there, the top line can be read out in the same way, creating the output signal, while another exposure is made on the image area. A framing rate of 60 pictures a second is possible with the Mavica —faster than a movie camera'*

Potential well *A voltage (10-15 V) applied to a picture element creates a site where electrons will prefer to gather—a potential well. Electrons, produced when light falls on the device, will collect in the well, whether produced on that electrode or adjacent ones which are maintained at a different voltage to act as a barrier to the charge packet's movement*

THE MINIATURE REVOLUTION

In the mid 1920s German manufacturers produced some revolutionary cameras that, because of their small size and versatility, were to change the face of photography

It is hard to imagine life without the 35mm camera. Most people whether they are interested in photography expect their newspapers and magazines to contain lively exciting photographs from the time of the other. Whether the subject is a guerrilla war or a garden party. Yet the vast majority of such pictures are taken on 35mm film and it is the miniature cameras as they used to be called that dominate the media. And it was very different

BBC Hulton Picture Library/John Frost Historical Newspaper Collection

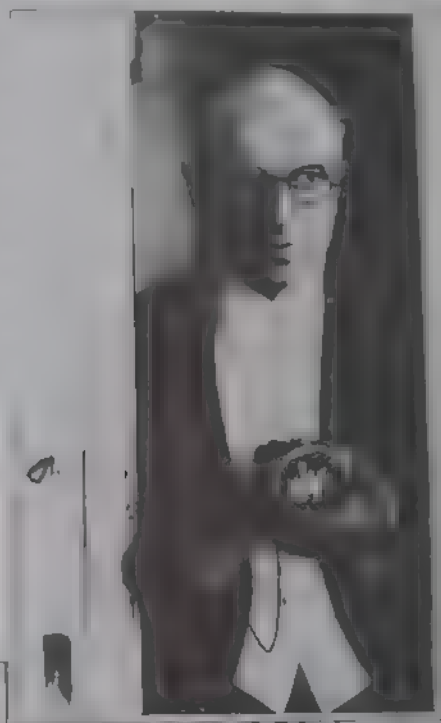
[illegible]

Berlin at Weimar Germany. It was a fairly small place [illegible] but it [illegible] design aspects [illegible] meet [illegible] meant and most important [illegible] capacity to use standard film [illegible] film.

This latter aspect meant [illegible] could expose [illegible] obtained on the film. Barnack [illegible] made the frame format exactly [illegible] as that of a movie [illegible] film but [illegible] were too small [illegible] Barnack chose the frame [illegible] coarse grained film [illegible] larger format [illegible] prints and [illegible] with his [illegible] film is of different situations [illegible] results included the documentary style [illegible] work with which the camera [illegible] became synonymous

The Leica I Model A was put into full scale production in 1924, just [illegible] years after the end of World War I. It was a period during which Germany underwent a cultural, social and political metamorphosis. For the first time in history the country had a democratically elected government, and the petty conservatism and formality that had stifled

The first cover of 'Picture Post' with its leaping cowgirls heralded a new type of magazine whose varied articles and original look was to be popular for 20 years



Erich Salomon *in characteristic guise as the discreet guest at political gatherings with his ever present Ermanox*

It's that Salomon again! *Aristide Briand points as the photographer snaps a bevy of French politicians at a banquet in 1931*

Announcing Leica's arrival *in 1925, the words of this advertisement were to prove truly prophetic, as the so-called miniature camera swept its competition from the field*

raculous For photojournalists in particular the new equipment meant an escape from the static, single shot

e pages to a story by

me, magazines and tly ran st

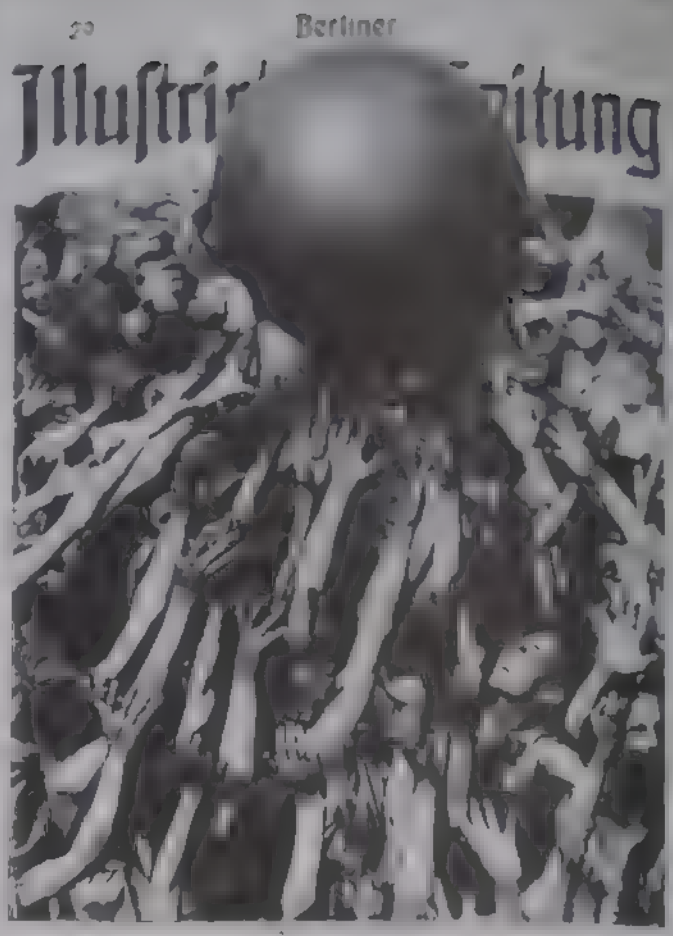
world Th Every Day r journey of th the Camera The appeal of these photographs was that they revealed to the reader the familiar day

exciting and different The street outside the window the trees and plants in the

A striking cover
From a July 1931

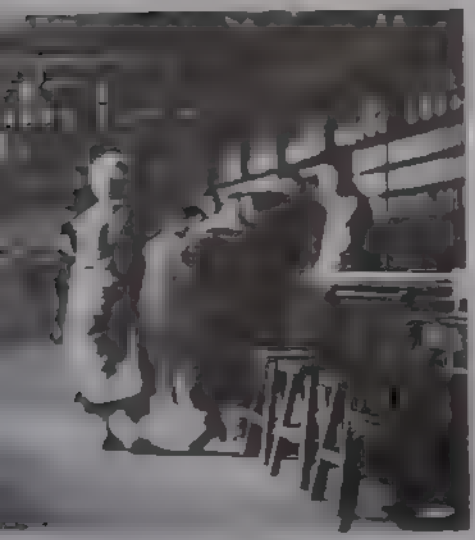
photographs the United State where he had emigrated in 1933 to escape the worsening political situation in Nazi Germany

Chinese apothecary
Photoessays, like this by Walter Bosshard, benefited from the imaginative layout used in Berliner Zeitung. Bosshard travelled extensively in Asia and was famous for a remarkable series of photoessays on the Gandhi peace movement in 1930 which were published in the Munchner Illustrierte



High jinks *Munkacsi's photoessays often captured some of the more light-hearted aspects of life in the early 1930s*

Martin Munkacsi



Walter Bosshard/Dephot/Creative Camera Library courtesy of C[illegible] Osmar

Despite [illegible] ments [illegible] have everything [illegible] long photojourna[illegible] continued to us[illegible] cameras [illegible] favourite moo[illegible] Rolleiflex, introduced [illegible] today is still prized by some photographers for its reliability and excellent picture quality. Another camera beloved of some photorepor[illegible] the Plaubrel Makina with an [illegible] lens. When not in use the lens could concertina into the camera body, so that the whole camera became a mere 50 mm thick. Although basically a plate camera it could be fitted with a twelve shot film pack instead of a single glass plate.

Advances in camera technology continued up to the start of World War 2 in 1939, but the best camera in the world is of no use to photojournalists unless they have the freedom to publish the results.

Martin [illegible] tesz and the famous photojourn[illegible] Gyula Hala[illegible] [illegible] sat From Gett[illegible] photographer [illegible] and the brilliant [illegible] *Münchner Illust*[illegible] [illegible]sten Lorant. Al[illegible] in Britain where, in 19[illegible] first editor of a new n[illegible] *Post*. Although Britain had a long h[illegible] of press photograph[illegible] *Mirror* had been runni[illegible] picture page since 1908, there had never been anything like *Picture Post* before. The first issue sold out completely on the same day it appeared on the news stands. The key to its success was in its use of photography. And its photographers included Lorant's fellow refugees Felix

Life's first issue *has as its cover Margaret Bourke-White's picture of Fort Peck Dam in Montana (1936)*

Photographer at work *The small cameras enabled Felix H. Man to penetrate previously forbidden areas, like this operating theatre. It was published over seven pages in the first issue of 'Picture Post'*

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pictures. Lorant would give it eight to ten
pages, and wh
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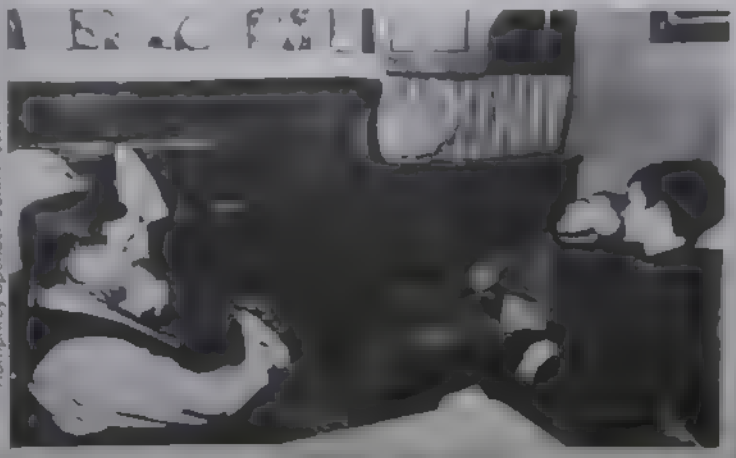
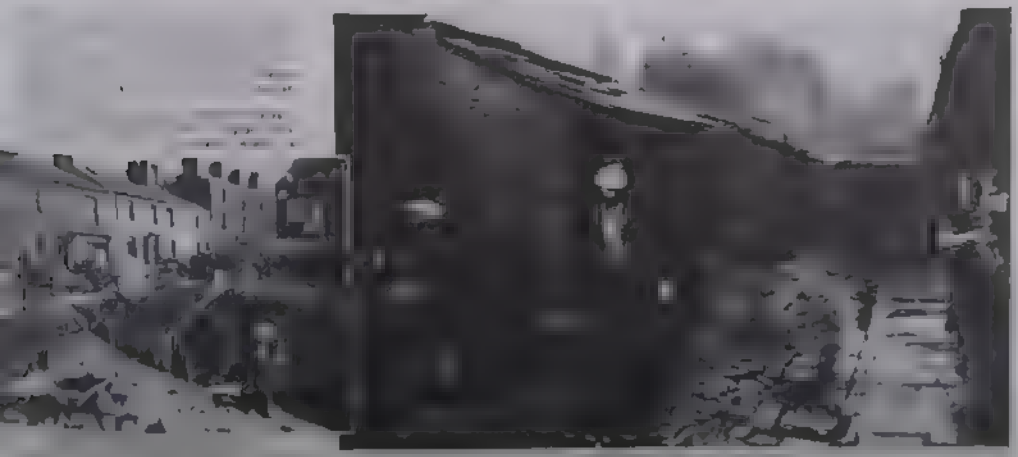
rather t
who matter
being the other wa
far as Lorant wa
if there were no pictures
story
before the launching of
ure Post, a magazine appeared in the
United States which was to become a
byword for the best in photojournalism.
On 23 November 1936 the first issue of
Life was published. It contained picture
stories on subjects as disparate as

SOME OF THE PICTURES THE AUTHORITIES KEPT BACK



Humphrey Spender John Frost H

Wigan [illegible] Post Times [illegible] great German photojournalist Felix H. Man [illegible] typical and stunning example of the kind of concerned photography for which Picture Post and its editor Stefan Lorant became famous



[illegible] the [illegible] ional photo

the grou[illegible] tripod, allowing them to use th[illegible] as they had alw[illegible]

Assignment

Pictures on a disc

Kodak's disc camera was primarily designed for the snapshooter but we wanted to see what could be produced in the hands of a professional

Homer Sykes

Woman sitting *The disc camera was ideal for the candid shots that Homer likes to take since no time is taken up by things like focusing or adjusting the exposure setting. This allowed him to concentrate on capturing natural expressions*

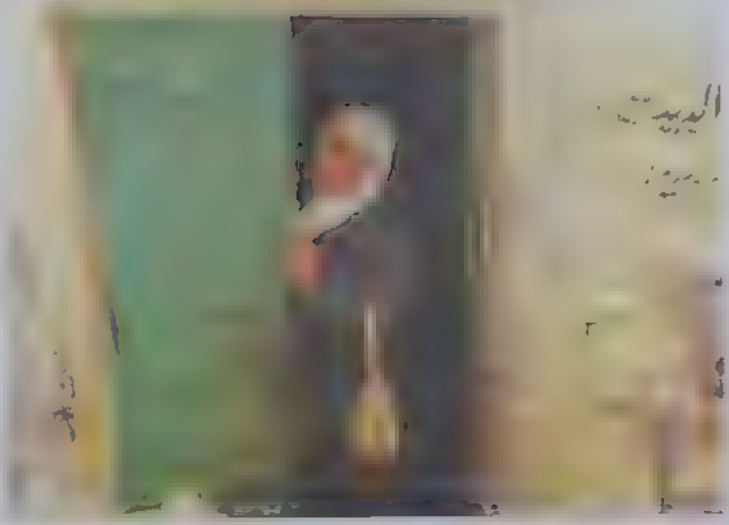
Headgear *The point and shoot feature of the disc camera was also useful for grabbing quick shots of moving subjects. Here, Homer composed the basic shot (left) and then waited for an interesting figure to walk into the picture*

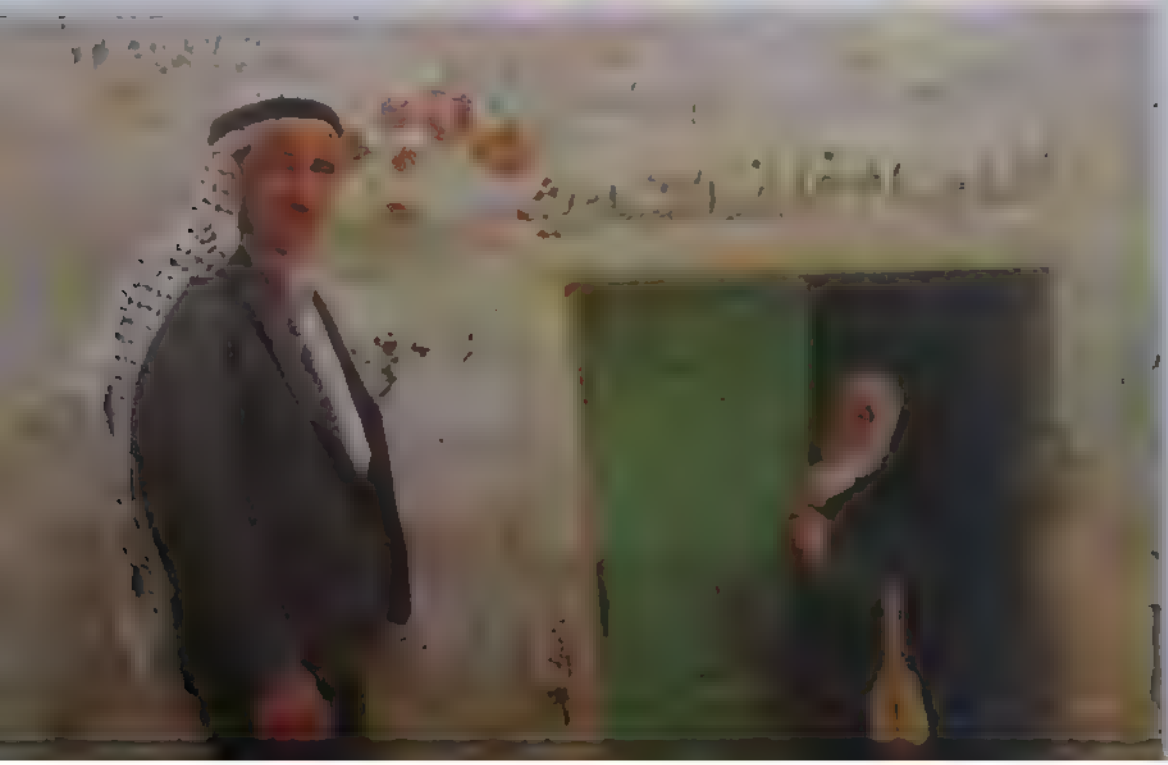
Painted wall *The viewfinder proved to be very accurate for a snapshot camera and the care which Homer took over his compositions can be appreciated in the final shot (above) though the child's face has lost detail because of the grain*

American tourists *The novel appearance of the camera aroused plenty of interest and occasionally provoked an amusing response*

Man and helmet *The tiny disc camera looks far less threatening than a full sized SLR so Homer found that people were not so suspicious about having their pictures taken—even at very close range*

In the doorway *The fixed focal length of the disc camera's lens forced Homer to take many of his pictures a certain way—here he was unable to move further back. However with his 35 mm SLR (below), he was able to fit a 28 mm lens and take in the whole scene including the man who was standing in the right part of the picture area Notice the difference in image quality between the two shots*





him

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people

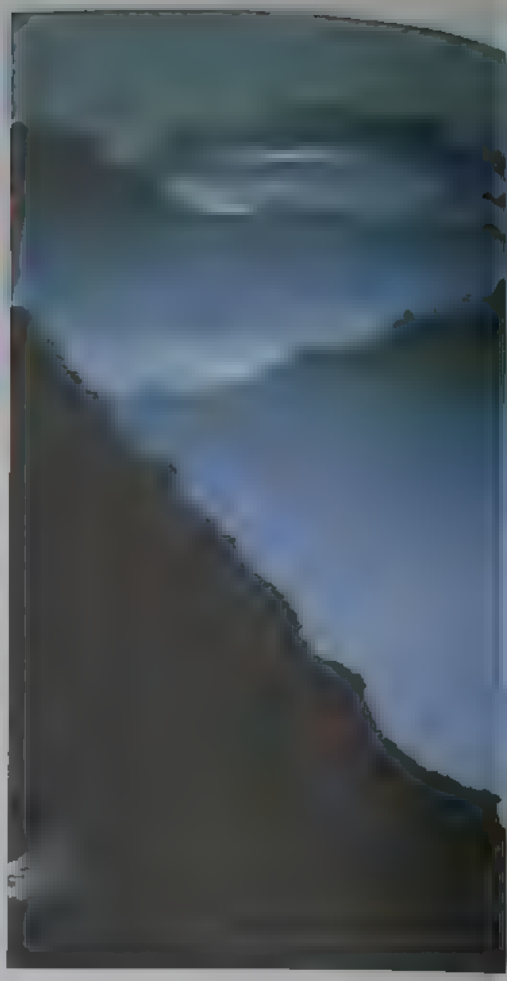
[ntage that occurred to omer was that this grai caused by the tiny negatives, each only 8 × 10 mm—made it unsuitable for making enlargements However, most people only want to use the camera for snapshots

Compared with most cartridge load cameras, the Disc camera takes very sharp pictures This is because the disc film can be kept very flat ensuring sharp focus all over the frame

Homer s pictures show that the camera can form a useful back-up to a 35 mm outfit, if the grainy pictures and lack of versatility are unimportant

Creative COLOUR

The association and impact of colour often goes unnoticed in everyday life. But if you know what effects colour can have, you can reinforce its values and gain more control over your images



Mountainscape *With careful selection and composition, it is possible to exploit the subtle variations of just one colour for an atmospheric landscape*

Yellow hull *Here the predominance of yellow gives the shot a summery feel, while the strength of the red is controlled by the careful framing*

Porch light *Warm colour, enhanced here by the late afternoon light, makes a shot appear more inviting—even if the subject itself is simple*

Pier in winter *A blue sky can make an ideal background, especially for warmer foreground colours. Here, underexposure strengthened the colours*

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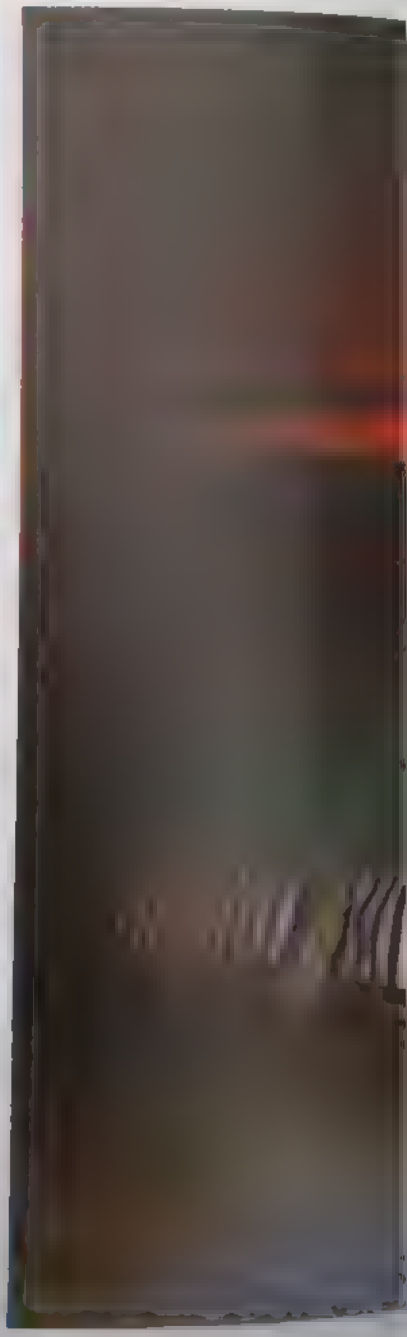
designers who have to apply a gr
of thought and research to the colours they use. Their aim is to identify people's reactions to colour in order to exploit these reactions. For example, just as people would be very wary of eating blue food—for blue is not a colour that is normally associated with food—so they may hesitate to buy food products wrapped in blue packaging. And just as
essential to the success or failure of a new consumer product, so it can be

John de Visser

Boatbuilding [illegible] boatbuilding.

Car emblem A polarizer [illegible] useful for [illegible] blue sky and to [illegible] colour [illegible] that makes this shot



they were taken decades ago, even if they were only taken yesterday. Look for the rich, solid feel of old polished wood and try using it as a background for appropriate still lifes, such as small antiques.

At the opposite end of the spectrum are the cold colours—blues and violets. Think of their associations—winter, ice, night, 'feeling blue'. Blue can have a very chilling, eerie effect—notice how often blue is the dominating colour in science fiction and horror films. You can use the same effect in your own photographs, shooting through blue filters or on tungsten film in daylight. This will make

John de Visser

Bench and shadows *A worthwhile technique is to select an area which is dull and grey, but to frame the shot to include a patch of bright colour*

Deckchairs *The striking colours of sunset can make strong photographs but it is best to include foreground interest like these flashlit deckchairs*

Chris Steele-Perkins/Magnum

Stephen J. Krasemann/DRK Photo

your friends and the most familiar objects take on a very sinister appearance.

But blue need not be only a sombre colour—it is also the colour of summer skies and can be the perfect counterpart for splashes of brighter colour. Blue is often used as a background for portraiture, as its cool dignity presents a strong contrast to the warmth of skin tones. Look for objects against a blue sky, such as buildings, trees, fences, and note the way that the colours react with each other. Another quality that makes blue the perfect colour for backgrounds is that it appears a recessive colour—that is it will appear to be behind other colours, since we associate it with distant views.

Red, on the other hand, is an advancing colour—it will appear to be in front of other colours. Thus in a shot of a red fence against a blue sky the red will appear almost to leap out of the background.

Shades of green *A large expanse of green does not always look attractive in a photograph, but here the variety of hues makes the colour more effective*

Green is a colour that is immediately associated with nature, the colour of plants, foliage and vegetation, and it can have a very restful, soothing effect. A leafy forest glade has a feeling of peace and serenity.

Black, white and grey can also be used in colour photography, often to good effect. Greys are rarely totally neutral, and are usually slightly tinted with colour, such as blue or pink. This slight cast can add a great deal of atmosphere. Grey is also the perfect foil for other colours as its neutrality emphasizes their hue. Black is also a good background colour, making colours appear much more intense and saturated.

Remember that there can be countless hues of each colour—there are cold-looking acid yellows as well as the warm yellows that Kodak use, and this can make a great deal of difference to our interpretation. In particular the human eye is very sensitive to variation in skin tone and the colour of food. People tend to respond more favourably to shots which are slightly warm, giving skin a faint glow, as if suntanned, making food look more appetizing and rooms look more welcoming. A slight blue bias can make people look very unhealthy, and rooms cold and unfriendly. These small changes in colour balance can be made using light balancing filters. More strongly coloured filters, such as graduated or effects filters, allow you to add colours of your choice in a variety of circumstances.

The more technical aspects of colour—notably the contrast and saturation—also have an effect on the final result. If you think of colours as being warm or cold, you can think of the contrast as the temperature difference. High contrast gives a very intense picture in which the warmth or coldness of the colours is exaggerated. Low contrast has a much more subtle effect.

You can control the contrast of your shots by the choice of film and filter. A slow, contrasty film used on a brilliantly sunny day with a polarizing filter gives one extreme, while a fast film shot on an overcast day with a diffuser gives the other. In addition, you can vary the appearance by under- or overexposing the film. Underexposing gives deep colours while overexposing desaturates them. These techniques give you additional means of controlling the intensity of colour in a shot.

When the values and qualities of colour are analyzed they seem very complicated, yet the photographer makes decisions about colours every time he or she takes a picture, even if it is only that the colours look nice. To learn more about the way colours work, it is a good idea to simply look at pictures, either your own or others', and to try and assess the effect that the colours have.

Ask yourself questions about the colours. Would the shot have worked as well in black and white? If colour is vital, what does it add to the image? Does it give a sense of mood or emotion, or does it merely respresent the colours that were in the scene? And does it exploit the potential of colour film, or is it an image that happens to be coloured?

Not every picture you take can be changed to make full use of colour. But it is worth doing what you can to exploit the beauty of colour photography wherever possible.

What went wrong?

WATER

Everyone is attracted by running water—yet often the results look dull, since the photographs fail to capture its vital ingredients. Colin Molyneux analyzes what went wrong with a variety of water shots

Light is to photography as heat is to cookery—the quality and quantity are important, and without it nothing happens at all. This picture is undercooked. It is flat, dull and uninteresting because the lighting is flat, dull and uninteresting. The ingredients are there—the shape and form of the creeper clad building and the dramatic flow or water through the arch, but there is nothing to give it any sparkle. Under the circumstances I would not have bothered to take a photograph at all. I would have come back and looked at the subject at different times of the day—even in the evening. Then perhaps lights in the windows or street lights would have given it a lift, and the long exposure necessary at dusk would have lent some interest to the water. If for some reason it was impossible to come back at another more favourable time I would have tried a telephoto lens, concentrating on the water and the section of the building with the arch only. An 81B filter (brownish) would have helped to warm up the cold colour

The one thing you need for a successful landscape photograph is patience. This picture would have benefited from a splash of light to give the water some sparkle. Failing any sunshine I would have tried using a very long shutter speed to give the water that lovely milky look and lift it out of the ordinary. In composition, a move to the left would have helped make the river lead the eye through the picture more. It would also have cut out the dustbin. I like this figure in red but I would have moved it down frame a little

All the elements for a dramatic picture—rushing water, hard graphic shapes of the rocks—are here, but the impact it should have had is lacking. The reason I feel is the composition. If the photographer had chosen an angle more directly over the flow of the water the picture would have benefited in two ways. First, it would have directed the viewer's attention to the most important element of the picture, the water itself. Secondly, the higher viewpoint would have made it possible to make more dynamic use of the natural diagonal of the stream by bringing it into the picture at the extreme top left corner of the frame and out at the bottom right. Always analyze the subject in the viewfinder before pressing the button